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NATIONAL DAM INSPECTION PROGRAM. PA-468 DAM (NDI ID NUMBER PA-0--ETC(U)
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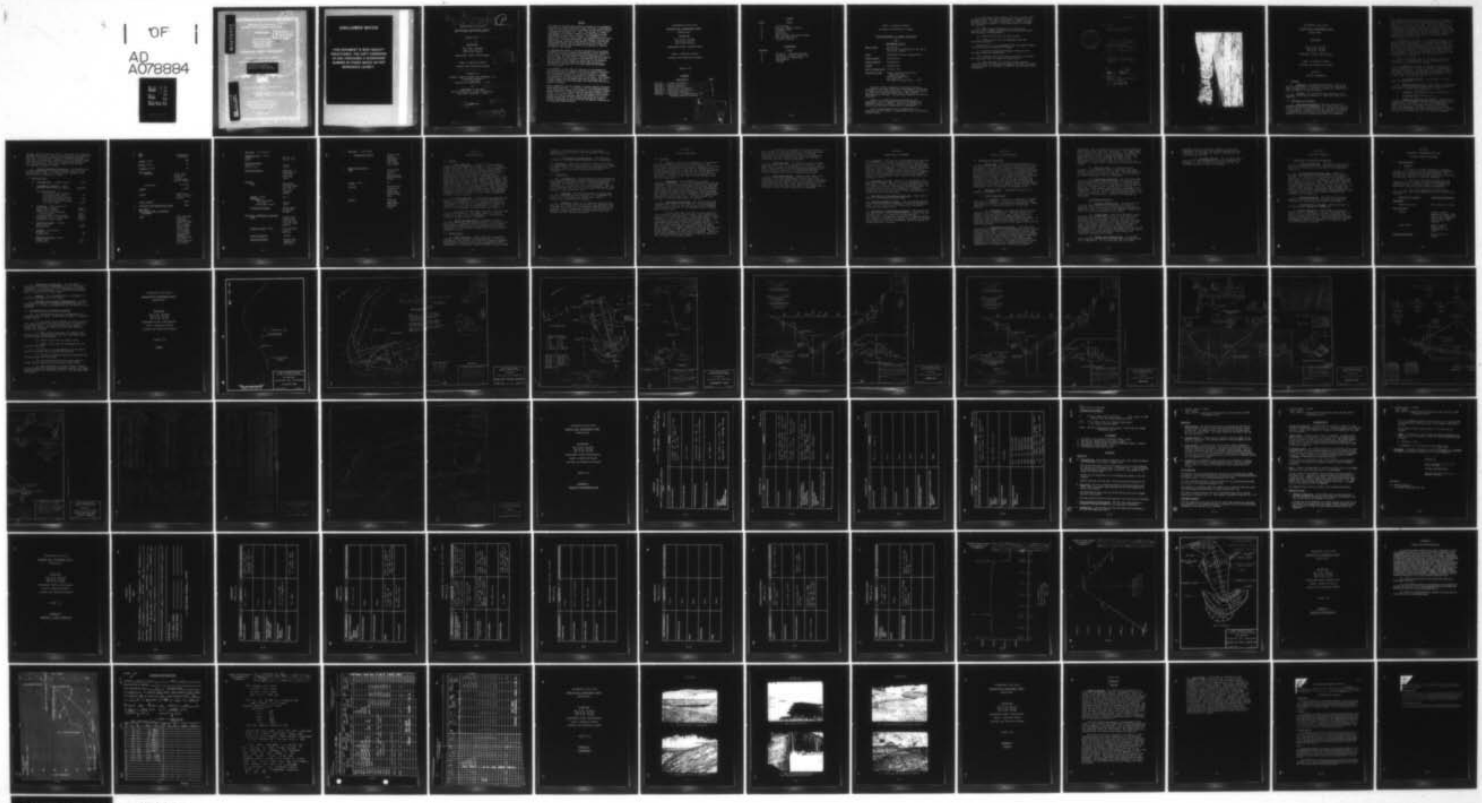

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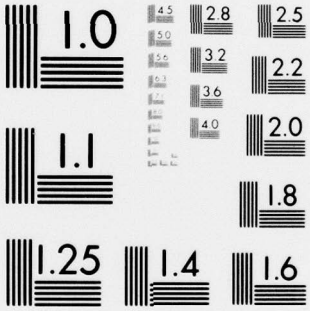

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(6) National Dam Inspection Program. PA-468 Dam (NDI-I.D. PA-00046, DER-I.D. 58-132, SCS-I.D. PA-468), SUSQUEHANNA RIVER BASIN, BROOKLYN RUN, SUSQUEHANNA COUNTY, PENNSYLVANIA. Phase I Inspection Report,

(1)

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

(10) Frederick / Futchko

Prepared by

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
P.O. Box 1963
Harrisburg, Pennsylvania 17105

For (15) DACW31-79-C-0015

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

(12) 79

(11) AUGUST 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1979

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	PA-468 Dam NDI ID No. PA-00046/DER ID No. 58-132 SCS ID No. PA-468
Owner:	Susquehanna County Commissioners
State Located:	Pennsylvania
County Located:	Susquehanna
Stream:	Brooklyn Run
Date of Inspection:	18 July 1979
Inspection Team:	Gannett Fleming Corddry and Carpenter, Inc. Consulting Engineers P.O. Box 1963 Harrisburg, Pennsylvania 17105

Based on visual inspection, available records, calculations and past operational performance, PA-468 Dam is judged to be in good condition. The existing spillway can pass the Probable Maximum Flood (PMF) without overtopping of the dam. The spillway capacity is rated as adequate.

There is a slope stability analysis for the embankment, and it indicates that the embankment has adequate factors of safety. There is no evidence of significant problems threatening the embankment.

The following measures are recommended to be undertaken by the Owner, in approximate order of priority, without delay:

(1) The Owner should request the SCS to verify that the design data upon which this report is based is, as assumed, valid. If other information is found to exist, the conclusions reached in this study should be checked for validity.

(2) Make repairs necessary to eliminate the separation and leakage between the main spillway conduit and the impact basin headwall.

(3) Remove rocks from the impact basin.

(4) Remove brush from the embankment and the auxiliary spillway.

In addition, it is recommended that the Owner modify his operational procedures as follows:

(1) Develop a detailed emergency operation and warning system for PA-468 Dam.

(2) Provide round-the-clock surveillance of PA-468 Dam during periods of unusually heavy rains.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system procedures.

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 17 September 1979

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF
ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 25 Sep 79

PA-468 DAM

Overview

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. The dam consists of a homogeneous earthfill embankment that is 680 feet long and 64 feet high at its maximum section. The main spillway is a drop spillway located near the left abutment of the dam. It consists of a concrete riser connected to a 30-inch diameter reinforced concrete pipe under the embankment.

One 12-inch by 21-inch uncontrolled orifice is located in the upstream face of the concrete riser with the orifice crest at El. 1227.0, which is 27 feet below design elevation of the top of the dam. The top of the riser is 8 feet below the design elevation of the top of the dam. A platform and trashrack are located above the riser. The outlet works is located at the main spillway. It consists of a 12-inch diameter steel pipe. The outlet works is closed off by a steel plate bolted into place at the downstream end of the pipe.

The auxiliary spillway is an excavated channel at the right abutment of the dam. It is grass-lined except for portions that were excavated into rock. At the control section, the auxiliary spillway has an earthen crest that is 75 feet long and 5.4 feet below the design elevation of the top of the dam and 2.6 feet above the crest of the main spillway. The various features of the dam are shown on the Plates at the end of the report and on the Photographs in Appendix D.

The total drainage area at the dam is 0.38 square mile; about 0.08 square mile of the drainage area is drained by a diversion ditch system.

b. Location. The dam is located on Brooklyn Run approximately 0.1 mile north of Brooklyn, Susquehanna County, Pennsylvania. PA-468 Dam is not shown on current USGS maps, because it was recently constructed. The coordinates of the dam are N41°45'20" -W75°48'25". The location map is shown on Plate 1.

c. Size Classification. Intermediate (64 feet high, 65 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for PA-468 Dam (Paragraph 5.1c. (5)).

e. Ownership. Susquehanna County Commissioners.

f. Purpose of Dam. Flood control.

g. Design and Construction History. PA-468 Dam was planned under an agreement between the Susquehanna County Commissioners (SCC-Owner) and the Soil Conservation Service of the U.S. Department of Agriculture (SCS). Under this agreement, the Owner acquired title to the land, the SCS designed and funded construction of the dam, and the SCC maintains the dam. The dam was designed

between 1964 and 1965 by the SCS. The permit to construct the dam was issued in 1965 and construction was started in May 1966. The Contractor was A.F. Costanzo and Sons, Scranton, Pennsylvania. Construction of the dam was under the supervision of Jesse Evans, contracting officer for SCC, and Henry Hurt, resident inspector for the SCS. The dam was completed in 1967.

h. Normal Operational Procedure. The reservoir is normally maintained at the crest of the orifice in the main spillway riser. The bolted-plate closure on the outlet works is normally in place.

1.3 Pertinent Data.

a.	Drainage Area. (square miles)	0.38
b.	Discharge at Damsite. (cfs)	
	Maximum known flood at damsite	Unknown
	Spillway capacity.	
	Orifice with pool at main spillway riser crest	40
	Main spillway with pool at auxiliary spillway crest	143
	Auxiliary spillway with pool at top of dam	2,775
c.	Elevation. (feet above msl)	
	Top of dam (design)	1254.0
	Maximum pool (design)	1252.0
	Normal pool (main spillway orifice crest)	1227.0
	Upstream invert outlet works	1214.0
	Downstream invert outlet works	1190.0
	Streambed at toe of dam	1190.0
d.	Reservoir Length. (miles)	
	Normal pool	0.03
	Maximum pool	0.11
e.	Storage. (acre-feet)	
	Normal pool	3
	Maximum pool	65
f.	Reservoir Surface (acres)	
	Normal pool	0.4
	Maximum pool	4.2

g.	Dam.	
	Type	Homogeneous earthfill
	Length (feet)	680
	Height (feet)	64
	Topwidth (feet)	17
	Side Slopes	
	Upstream	1V on 3.5H. There is a 10-foot sloping berm at El. 1228.0.
	Downstream	1V on 2H
	Zoning	None
	Cutoff	Impervious fill in cutoff trench.
	Grout Curtain	None
h.	Diversion and Regulating Tunnel	None
i.	Spillway.	
	Main (Principal or Service) Spillway	
	Type	Drop spillway. Vertical rectangular riser 2.5 feet by 7.5 feet, with rounded crest; one 1-foot high by 1.75-foot long orifice located on upstream face of riser. Riser connects to conduit.

i. Spillway. (continued)

Length of Weir (feet)	
Orifice	One at 1.75
Riser	Two at 7.5
Crest Elevation	
Orifice	1227.0
Top of riser	1246.0
Upstream Channel	Reservoir; a platform is 1.75 feet above the riser.
Conduit	
Type	Reinforced concrete pipe, 2.5 feet in dia., on concrete cradle.
Length (feet)	231.9
Elevation	
Upstream invert at riser	1204.0
Downstream invert	1190.0
Downstream Channel	Impact basin at natural stream.
Auxiliary (Emergency) Spillway	
Type	Grass-lined earthen and rock cut with 1V on 2H side slopes.
Length of Weir (feet)	75 at earthen control section.
Crest Elevation	1248.6
Upstream Channel	Grass-lined channel to reservoir.

i. Spillway. (continued)

Downstream Channel	Grass-lined channel extending to overbank. Left slope has riprap.

j. Regulating Outlets.

Type	Steel pipe, 12-inch dia., extending to main spillway riser.
Length (feet).	44
Closure	Bolted-plate closure in riser at downstream end of steel pipe.
Access	Hatch in platform above main spillway riser.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. A summary of the available design data is in Appendices A and C. The SCS design folder for PA-468 Dam, which normally contains specifications, hydrologic and hydraulic design computations, results of geologic investigations and soils testing, slope stability analyses, and structural design computations, was not available in PennDER's files. It was available in the SCS files. Upon examination, it was found that each section of the design folder, except the hydrologic and hydraulic design section, contained a cover sheet with "void" marked on it. SCS personnel said that they were unaware of the actual status of the information and did not know why it was marked void. They stated that they would conduct further research and contact Gannett Fleming Corddry and Carpenter, Inc. (GFCC) if additional information could be found. No additional information became available to GFCC.

b. Design Features. The dam and appurtenances are described in Paragraph 1.2a. The design features are shown on the Plates at the end of the report and on the Photographs in Appendix D. The embankment is shown on Plates 2, 3, and 4, and on Photographs A, B, and C. A plan of the subdrainage system is shown on Plate 5.

The main spillway riser is shown on Plates 6 and 7 and on Photograph C. The impact basin is shown on Plates 2, 3, and 4 and on Photograph D. The watershed diversion system is shown on Plate 8.

c. Design Considerations. Although the main spillway design has been used successfully by the SCS for many years, it appears that the entrance to the conduit could possibly develop cavitation during certain flow conditions. Other design considerations are discussed in Sections 5 and 6.

2.2 Construction.

a. Data Available. Construction data available consist of the construction specifications, construction photographs, and reports both from the resident inspector and from the periodic construction inspections by the Commonwealth. No adverse items were noted in any of these

reports. The project was reported to have been constructed in accordance with the approved plans and specifications.

b. Construction Considerations. The available information indicates that the dam is well constructed.

2.3 Operation. Records of operation consist of reports of annual inspections conducted by the SCS and SCC. Based on these reports, all structures have performed satisfactorily, and only normal maintenance has been necessary.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dams and Waterway Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER), and by the SCS. A SCC representative was available for information during the inspection. The SCS also researched the files for additional information upon request of the inspection team.

b. Adequacy. The type and amount of design data and other engineering data are good. The assessment is based on the combination of design data, visual inspection, and performance history.

c. Validity. There is no reason to question the validity of the available construction and operation data. Although the validity of the available design data is in question, due to being marked "void", GFCC could find no apparent changes between the aforementioned available design data and the approved plans.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The overall appearance of the dam is good with a few deficiencies as noted herein. The locations of deficiencies are shown in Appendix B on Plate B-1. Survey data acquired during this inspection are presented in Appendix B. Datum for the survey was assumed at the design elevation of the end sill of the impact basin, El. 1190.00. On the day of the inspection, the pool was 0.1 foot above the crest of the orifice in the main spillway riser.

b. Embankment. The embankment is in good condition. The grass cover on the upstream slope and the crownvetch cover on the downstream slope are in excellent condition. There is no slope protection on the upstream slope other than the grass cover. A survey performed for this inspection showed that embankment lines and grades are in good conformance with the design lines and grades. Two foundation drain outlets, located at the impact basin, each had a slight, clear flow. Two small shrubs were growing on the downstream slope of the dam.

c. Appurtenant Structures. The outlet works was submerged and could not be inspected. The bolted-plate closure in the riser at the end of the 12-inch diameter outlet works pipe could not be inspected due to flowing water in the riser.

The main spillway riser was in good condition. The reinforced concrete outlet conduit was inspected and found to be in good condition. Joint separations, up to a maximum of 1 inch, were observed along the conduit. The joint separations were nearly zero at each end and increased progressively toward the maximum section of the dam. At its downstream end, the reinforced concrete outlet conduit was slightly separated from the impact basin headwall. A slight, clear flow of water was visible at the separation. The impact basin contained several large rocks, apparently the result of vandals. There was some minor spalling of the concrete along the inside of the left wall of the impact basin.

The auxiliary spillway was in good condition. A minor amount of brush was growing in the approach area, but no other deficiencies were noted. The survey indicated that the difference in elevation between the auxiliary spillway crest and the top of the dam was consistent with the design difference.

d. Reservoir Area. The reservoir area has steep, grassed slopes, and it is utilized as a pasture. The watershed is nearly all farmland with only minor development. The watershed diversion system was generally in good condition, except that the inlet area for the 54-inch diameter culvert was overgrown with brush.

e. Downstream Channel. Brooklyn Run flows for a distance of 0.4 mile downstream from the dam to its confluence with Hop Bottom Creek. The Village of Brooklyn is situated along Brooklyn Run from 0.1 mile to 0.4 mile downstream from the dam. There are approximately 25 low-lying dwellings along this reach. The access road to the dam is a public road along the left abutment.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at the crest of the orifice in the main spillway riser, Elevation 1227.0, with excess inflow discharging over the spillway and into Brooklyn Run, which flows into Hop Bottom Creek about 0.4 mile downstream. A 30-inch diameter reinforced concrete conduit discharges water from the reservoir. Since the 12-inch diameter outlet works pipe is intended only for drawing down the reservoir, the bolted-plate closure on its downstream end, located in the riser, is usually in place.

4.2 Maintenance of Dam. There are no designated caretakers for the dam. The SCC, with the assistance of the SCS, makes a formal inspection of the dam each year, and the records are filed. Maintenance deficiencies are corrected shortly after the inspection. Informal inspections are also made when the SCC representative is on the site for other reasons.

4.3 Maintenance of Operating Facilities. There are no gates or other operating facilities.

4.4 Warning Systems in Effect. The SCC Representative stated that there was no emergency operation and warning plan. He did state that the condition of the dam is checked during heavy rains.

4.5 Evaluation of Operational Adequacy. Maintenance of the dam is good. The procedures used to inspect the dam are good, as is the correction of maintenance deficiencies. An emergency operation and warning system is a necessary safeguard to improve the safety of the dam and prevent loss of life downstream, should evidence of stress develop at the dam.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. The hydrology and hydraulics of the design of the dam were based on standard SCS criteria. The crest of the orifice in the main spillway riser was determined by sediment requirements. The crest elevation of the main spillway riser and the crest elevation of the auxiliary spillway were set by routing 100-year storms based on SCS procedures. The design high water level was determined by routing a storm equal to 1.25 times the 100 year, 6-hour storm. The top of dam elevation and auxiliary spillway size were determined by routing the "Freeboard" storm, which is equal to twice the design high water storm (2.5 times the 100-year, 6-hour storm). The "Freeboard" storm is discussed in Paragraph 5.1d.

b. Experience Data. The maximum flood at the damsite is unknown.

c. Visual Observations.

(1) General. The visual inspection of PA-468 Dam, which is described in Section 3, resulted in some observations relevant to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The slope protection on the upstream slope is dense grass. Although there is no riprap, the erosion potential due to wave action is minimal. The combination of small maximum pool (4.2 acres) and dense vegetal cover makes erosion unlikely. In addition, the good maintenance record for the dam indicates that any minor erosion that might occur would be repaired promptly.

(3) Appurtenant Structures. Although joint separations as large as 1 inch were present in the 30-inch main spillway conduit, the Specifications indicate that the pipe joints have a minimum extensibility of 2 inches. Therefore, the joint openings are less than the allowable openings, and the joints should be watertight. The connection of the outlet conduit to the impact basin headwall is not watertight. Although this condition has apparently not resulted in any adverse effects, it is considered to be undesirable. Potentially adverse

conditions, such as possible loss of fine filter material, might occur under high head conditions. The large rocks in the impact basin are also considered to be undesirable. During periods of high spillway discharge, turbulence might cause the rocks to damage the impact basin. The amount of brush in the auxiliary spillway is not significant at the present time, but control of it is necessary to insure that no reduction of spillway capacity occurs.

(4) Reservoir Area. No conditions were observed in the reservoir area or watershed that might present significant hazard to the dam. The assessment of the dam is based on existing conditions, and the effects of future development are not considered.

(5) Downstream Conditions. No conditions were observed immediately downstream from the dam that would create significant hazard to the dam. If the dam should fail, a hazard would exist to dwellings in the Village of Brooklyn. Because of the possibility of flooding dwellings, a high hazard classification is warranted for PA-468 Dam. The SCS designed the dam assuming that it was a Class C structure. This is essentially equivalent to a high hazard classification. Access to PA-468 Dam is excellent.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE) for the size (Intermediate) and hazard potential (High) of PA-468 Dam, the Spillway Design Flood (SDF) is the Probable Maximum Flood (PMF).

(2) Design Storm. The SCS "Freeboard" storm, which was used to determine the size of the auxiliary spillway and the top elevation of the dam, was not developed from PMF methods. However, the total rainfall of 24.5 inches is equivalent to a PMF rainfall for this area. The assumed losses of 3.3 inches are slightly higher than those established by criteria for the Susquehanna Basin, but the unit hydrograph used by the SCS is conservative. The computed peak inflow of 2,734 cfs is equivalent to a PMF peak inflow. The storm is an acceptable estimate of the PMF.

(3) Design Storm Computations. The design storm computations and the spillway capacity computations are in Appendix C. It is noted that the auxiliary

spillway alone has sufficient capacity to pass the "Freeboard" storm peak flow without routing the flow. Therefore, the spillway can pass the PMF without any overtopping of the dam.

(4) Spillway Adequacy. The criteria used to rate the spillway adequacy of a dam are described in Appendix C. Since PA-468 Dam can pass the PMF, the spillway capacity is rated as adequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. Nothing was noted during the visual inspection that was considered to adversely reflect on the stability of the dam or its appurtenant structures.

b. Design and Construction Data. Stability analyses were performed by the SCS during the design of the dam. The results of the analyses are included in Appendix A. The factors of safety for the upstream slope were computed to be 1.12 considering horizontal flow and 1.20 considering parallel flow. The factors of safety for the downstream slope were computed to be 1.25 for an infinite slope analysis with a dry slope condition and 3.0 using a wedge analysis. The design shear strength was based on the consolidated-undrained strength obtained from a triaxial shear test. These factors of safety are considered to be adequate.

c. Operating Records. The reports of previous inspections indicate that no stability problems have occurred over the operational history of the dam.

d. Postconstruction Changes. There have been no postconstruction changes to PA-468 Dam.

e. Seismic Stability. PA-468 Dam is located in Seismic Zone 1. Normally, it can be considered that if a dam in this zone has adequate factors of safety under static loading conditions, it can be assumed safe for any expected earthquake loading. Since the factors of safety are adequate, the dam is assumed to be stable for any expected earthquake loading.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on visual inspection, available records, calculations, and past operational performance, PA-468 Dam is judged to be in good condition. The spillway can pass the PMF without overtopping of the dam. The spillway capacity is rated as adequate.

(2) There is a stability analysis for the embankment, and it indicates that the embankment has adequate factors of safety. There is no evidence of significant problems threatening the embankment.

(3) The visual inspection revealed some deficiencies, which are summarized below for the various features.

Feature and Location	Observed Deficiencies
Embankment:	
Downstream Slope	Minor amount of brush.
Main Spillway:	
Conduit	Conduit joints separated; slight separation of conduit from impact basin headwall with slight, clear leakage.
Impact Basin	Rocks in impact basin; minor spalling of concrete.
Auxiliary Spillway:	Minor amount of brush.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented without delay.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will be required.

7.2 Recommendations and Remedial Measures.

a. The following measures are recommended to be undertaken by the Owner, in approximate order of priority, without delay:

(1) The Owner should request the SCS to verify that the design data upon which this report is based is, as assumed, valid. If other information is found to exist, the conclusions reached in this study should be checked for validity.

(2) Make repairs necessary to eliminate the separation and leakage between the main spillway conduit and the impact basin headwall.

(3) Remove rocks from the impact basin.

(4) Remove brush from the embankment and the auxiliary spillway.

b. In addition, it is recommended that the Owner modify his operational procedures as follows:

(1) Develop a detailed emergency operation and warning system for PA-468 Dam.

(2) Provide round-the-clock surveillance of PA-468 Dam during periods of unusually heavy rains.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system procedures.

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

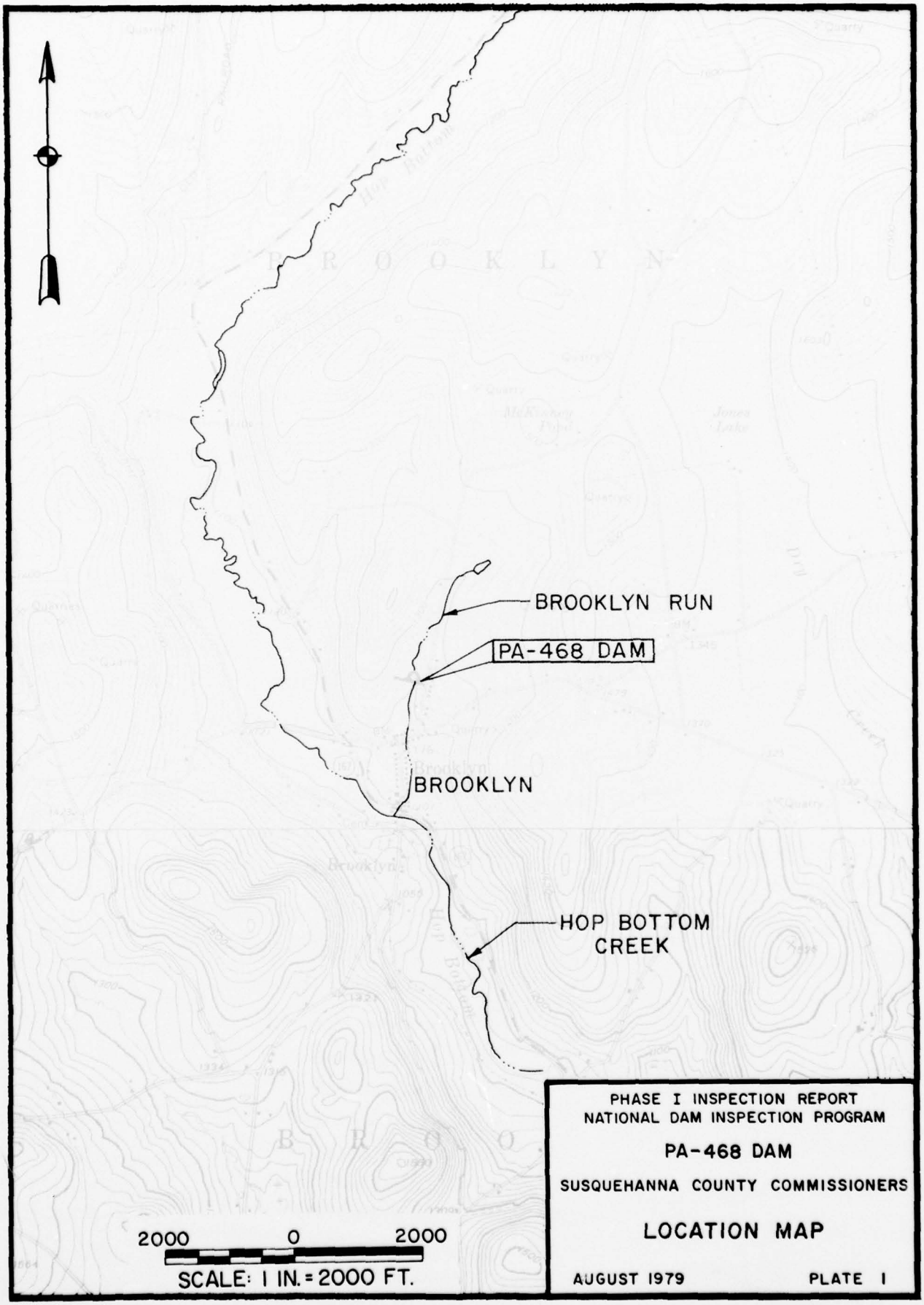
SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1979

PLATES



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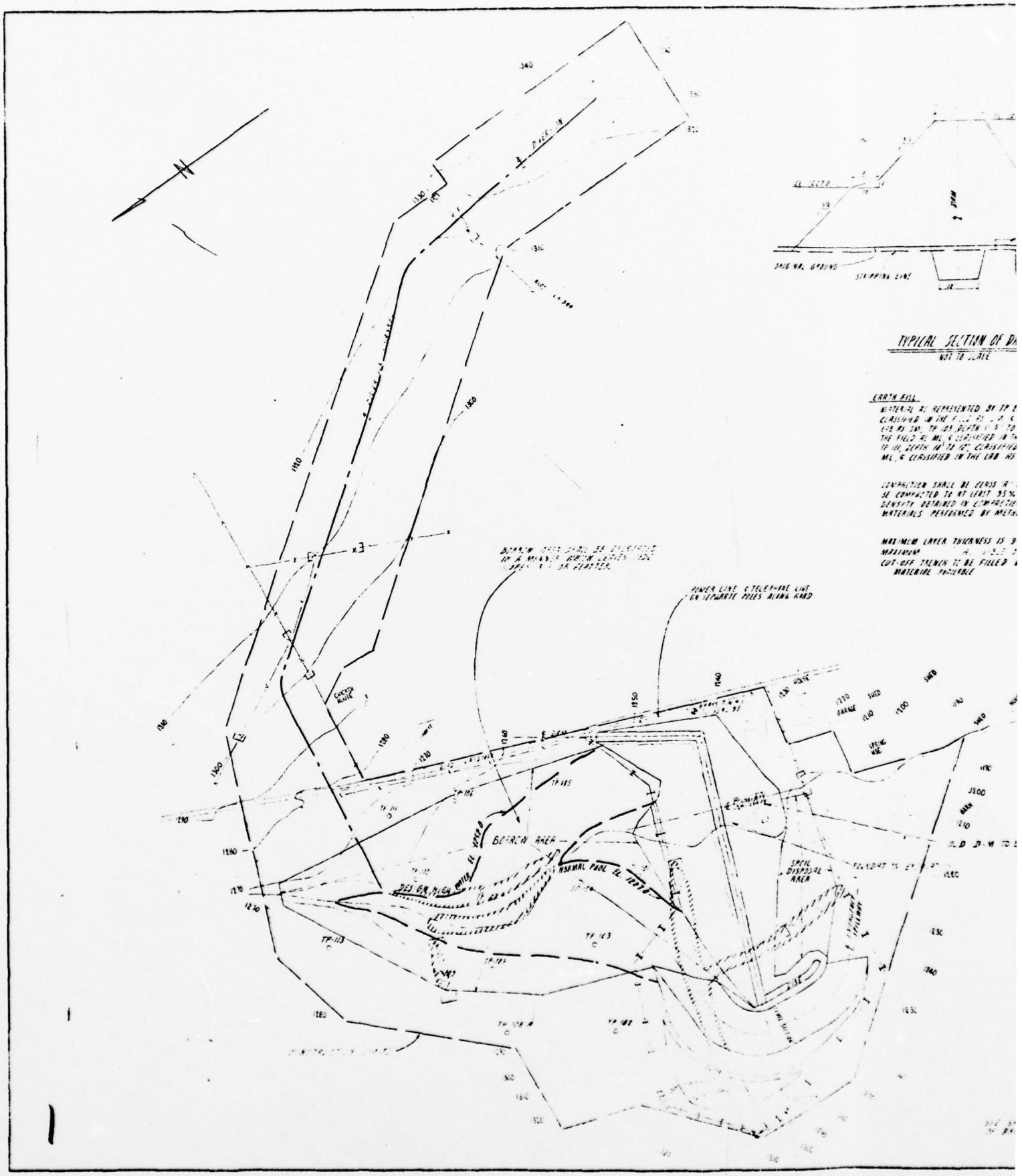
NATIONAL DAM INSPECTION PROGRAM

PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

LOCATION MAP

AUGUST 1979 PLATE 1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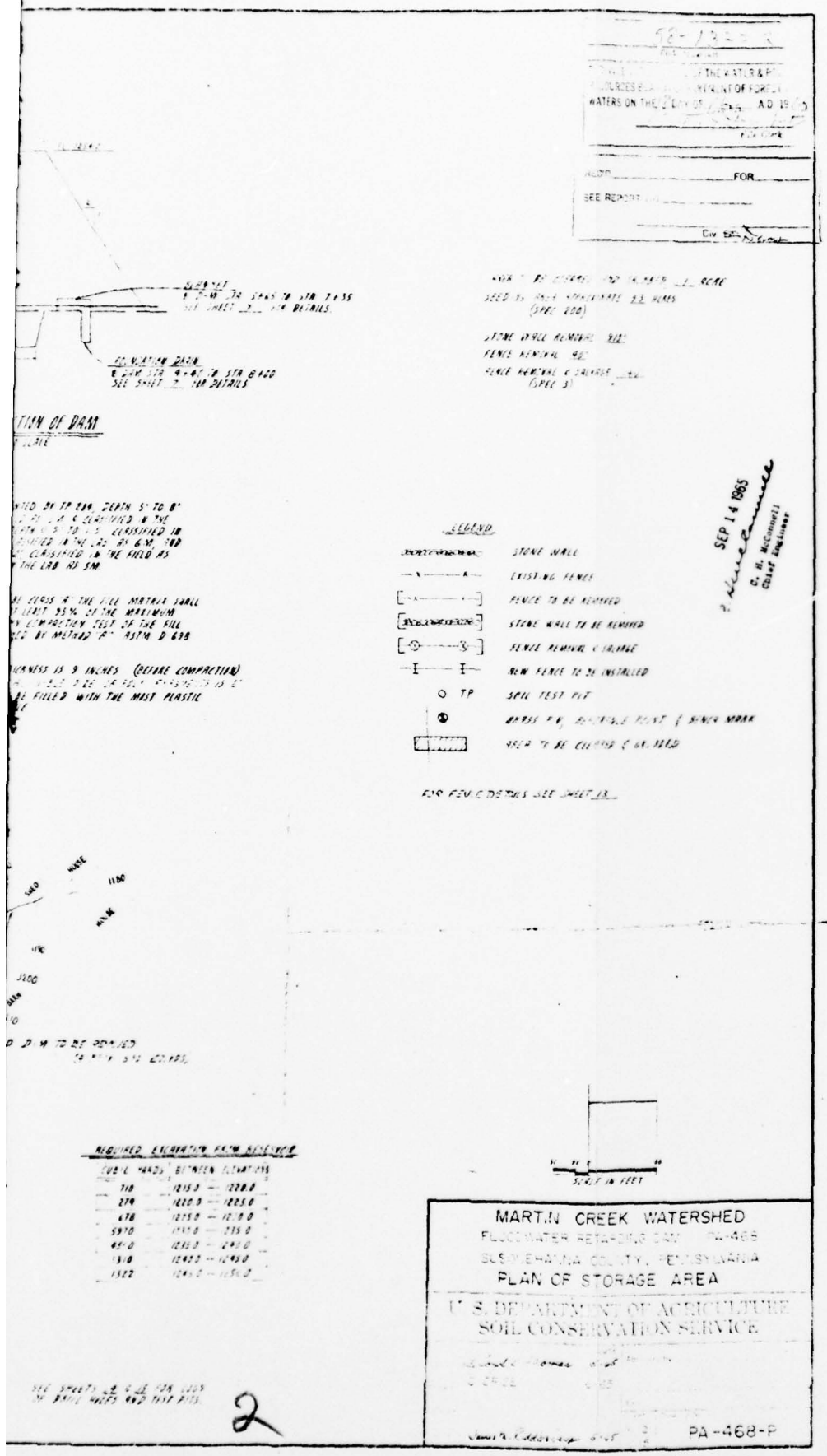

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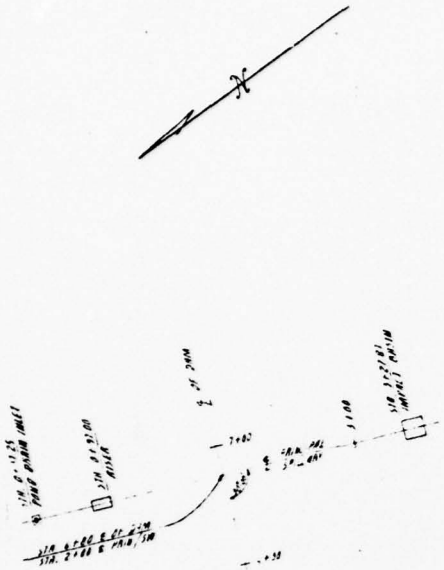
PA-468 DAM

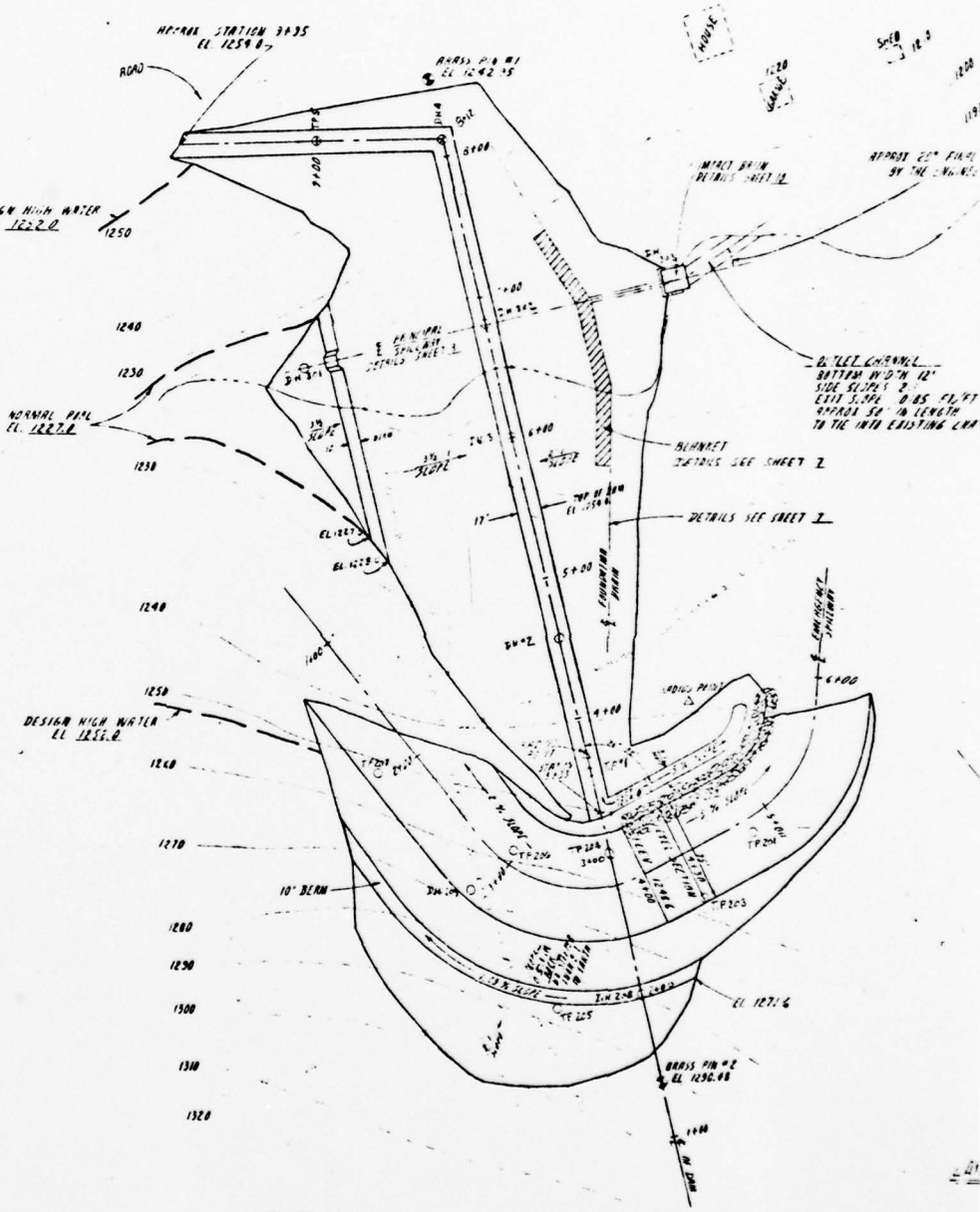
SUSQUEHANNA COUNTY COMMISSIONERS

PLAN AND TYPICAL SECTION

AUGUST 1979 PLATE 2



LAYOUT OF PRINCIPAL SPILLWAY
NOT TO SCALE



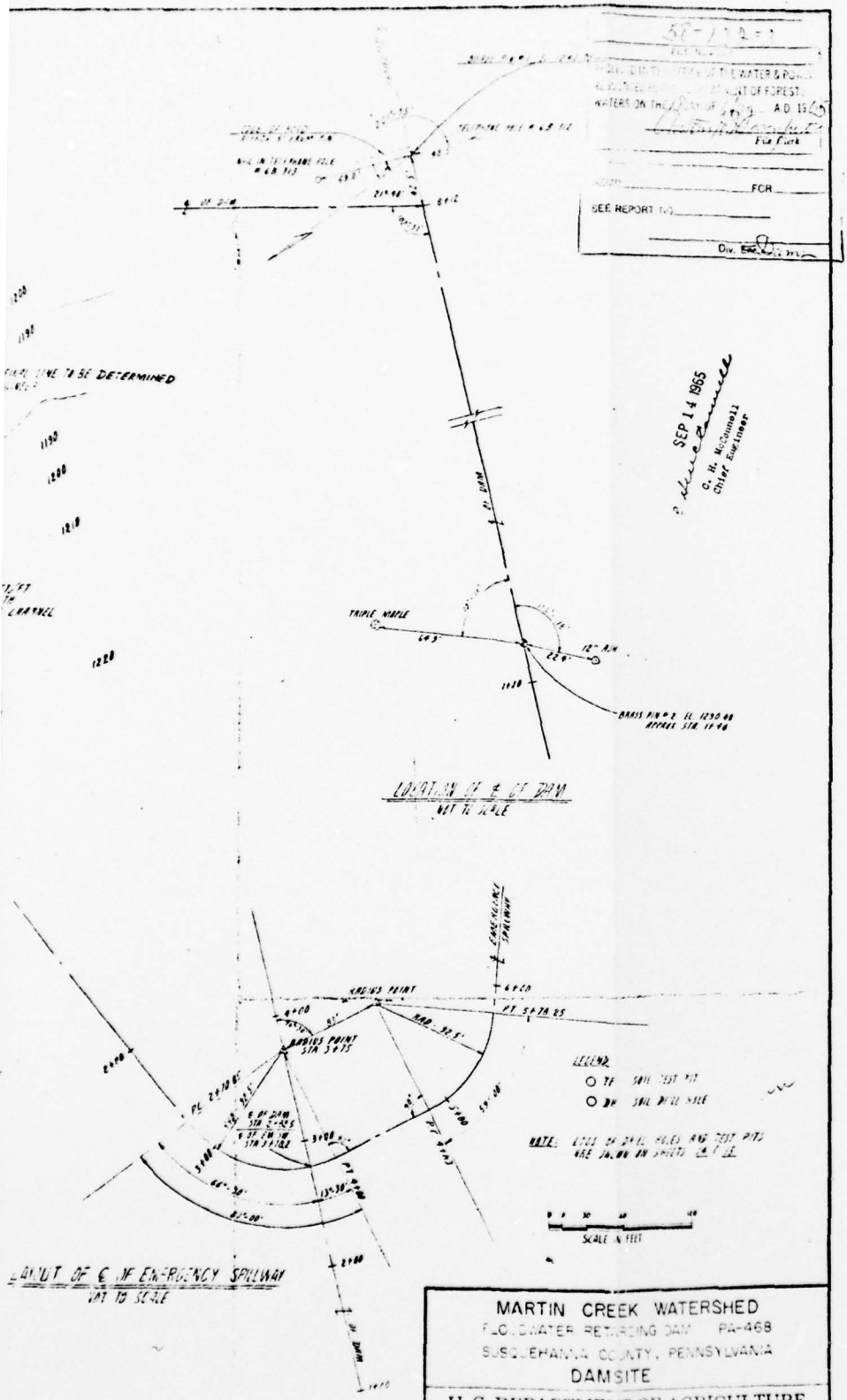
EMERGENCY SPILLWAY & CURVE DATA

UPSTREAM CURVE	DOWNSTREAM CURVE
I = 80°-00'	I = 59°-00'
R = 92.5'	R = 92.5'
T = 77.62'	T = 52.33'
Lc = 129.15'	Lc = 95.25
CH = 118.92'	CH = 91.14'
M = 21.64'	M = 11.99'
E = 28.25'	E = 13.77'
P.C. = STATION 2+70.85	P.C. = STATION 4+03.00
P.T. = STATION 4+00.00	P.T. = STATION 5+78.25

STATION	DEFLECTION	CHORD
P.C. 2+70.85	0°-00'	–
2+83.77	4°-00'	12.91
2+96.68	8°-00'	"
3+09.60	12°-00'	"
3+22.51	16°-00'	"
3+35.43	20°-00'	"
3+48.34	24°-00'	"
3+61.26	28°-00'	"
3+74.17	32°-00'	"
3+87.09	36°-00'	"
P.T. 4+00.00	40°-00'	"

STATION	DEFLECTION	CHORD
P.C. 4+03.00	0°-00'	–
4+15.91	4°-00'	12.91
4+28.83	8°-00'	"
4+41.74	12°-00'	"
4+54.66	16°-00'	"
4+67.57	20°-00'	"
4+80.49	24°-00'	"
4+93.40	28°-00'	"
5+06.32	32°-00'	"
5+19.23	36°-00'	"
P.T. 5+78.25	39°-50'	6.04

TYPICAL SECTION OF EMERGENCY SPILLWAY
NOT TO SCALE



MARTIN CREEK WATERSHED
FLOODWATER RETARDING DAM PA-468
SUSQUEHANNA COUNTY, PENNSYLVANIA
DAMSITE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PA-468-P

2

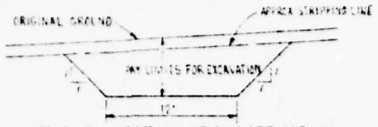
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

ALIGNMENT PLAN

AUGUST 1979 PLATE 3



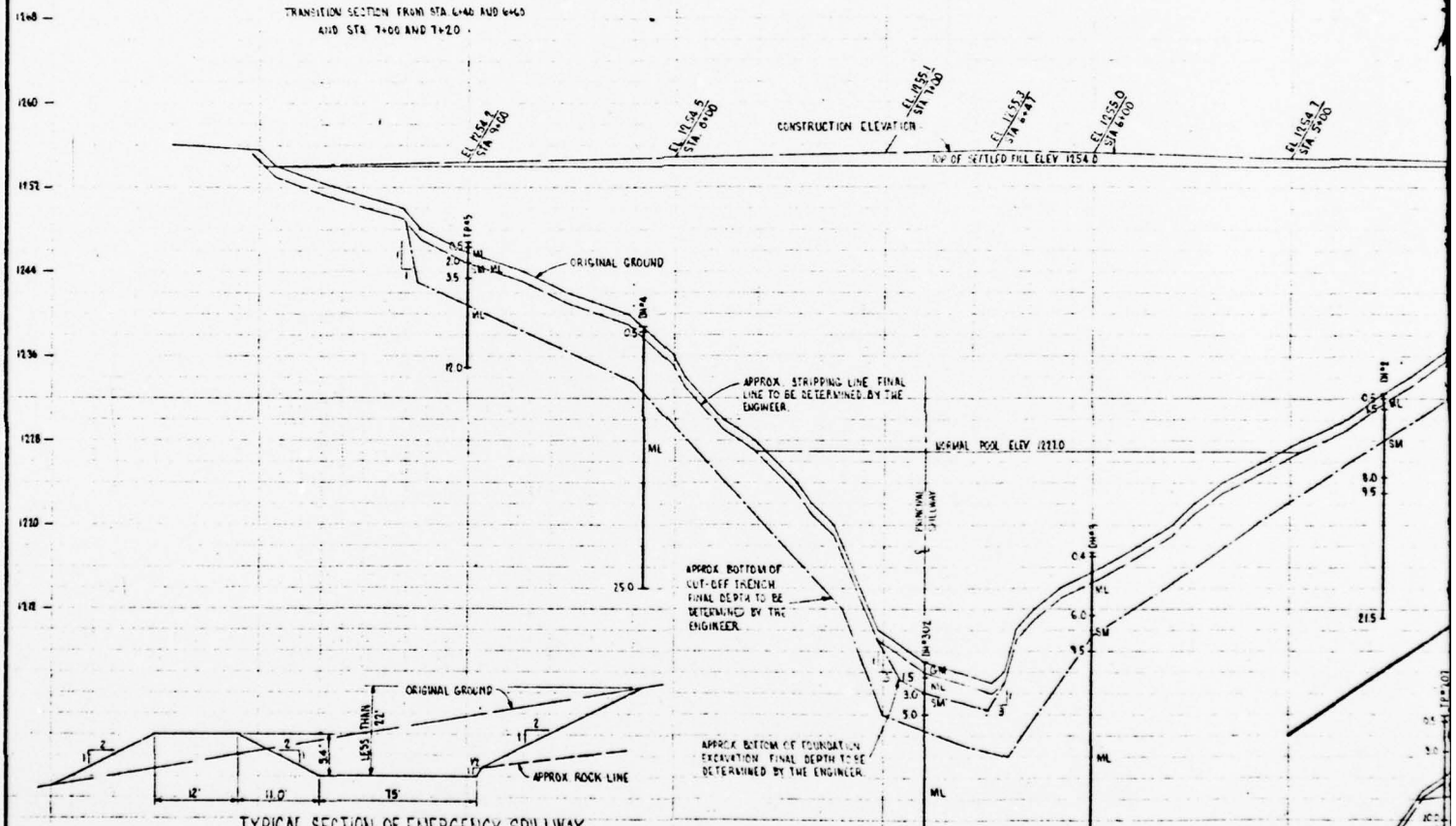
TYPICAL SECTION OF CUT-OFF TRENCH

SECTION BETWEEN STA 3+40 AND 6+40 AND STA 7+20 AND 9+30.

TYPICAL SECTION OF CUT-OFF TRENCH

SECTION BETWEEN STA 6+60 AND 7+00

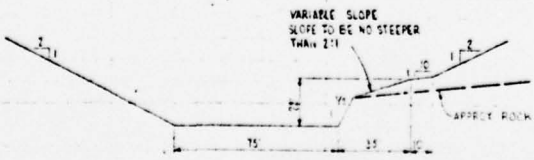
TRANSITION SECTION FROM STA 6+40 AND 6+60 AND STA 7+00 AND 7+20.



TYPICAL SECTION OF EMERGENCY SPILLWAY WITH DIKE (NO BERM)

— LOOKING DOWNSTREAM —

NOT TO SCALE



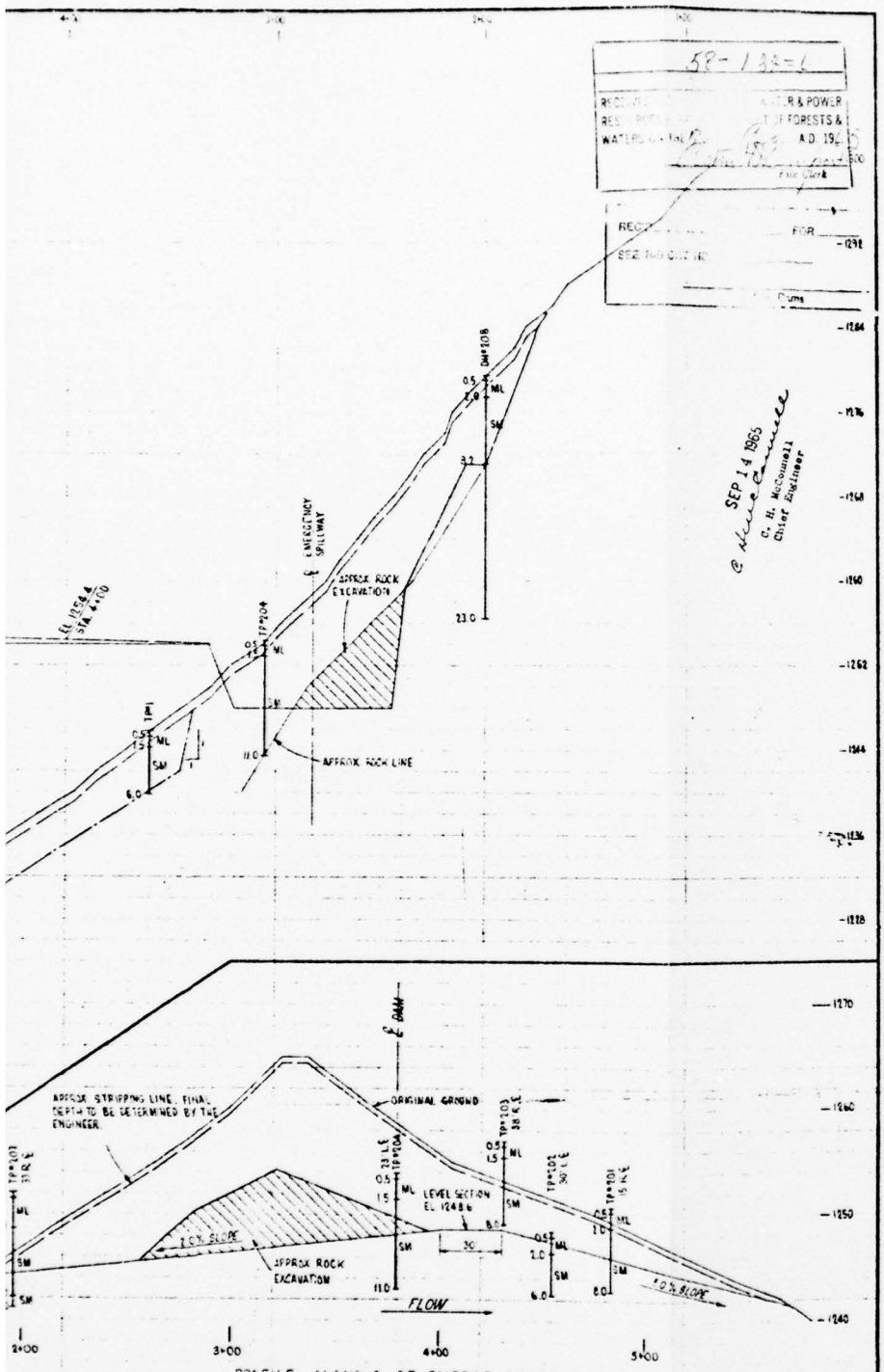
TYPICAL SECTION OF EMERGENCY SPILLWAY WITH BERM

— LOOKING DOWNSTREAM —

NOT TO SCALE

PROFILE ALONG CENTERLINE OF DAM

— LOOKING DOWNSTREAM —



PROFILE ALONG ℄ OF EMERGENCY SPILLWAY

MARTIN CREEK WATERSHED
FLOODWATER RETARDING DAM PA-468
SUSQUEHANNA COUNTY, PENNSYLVANIA
PROFILES - DAM & EMERGENCY SPILLWAY
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Leopold Thomas 5-65
R. A. STALTER 6-65
James M. Rudisinger 6-65

PA-468-P

Form SCS-316 (November 1955)

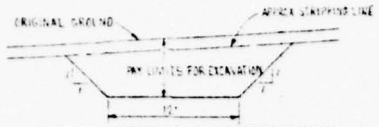
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

PROFILES

AUGUST 1979 PLATE 4



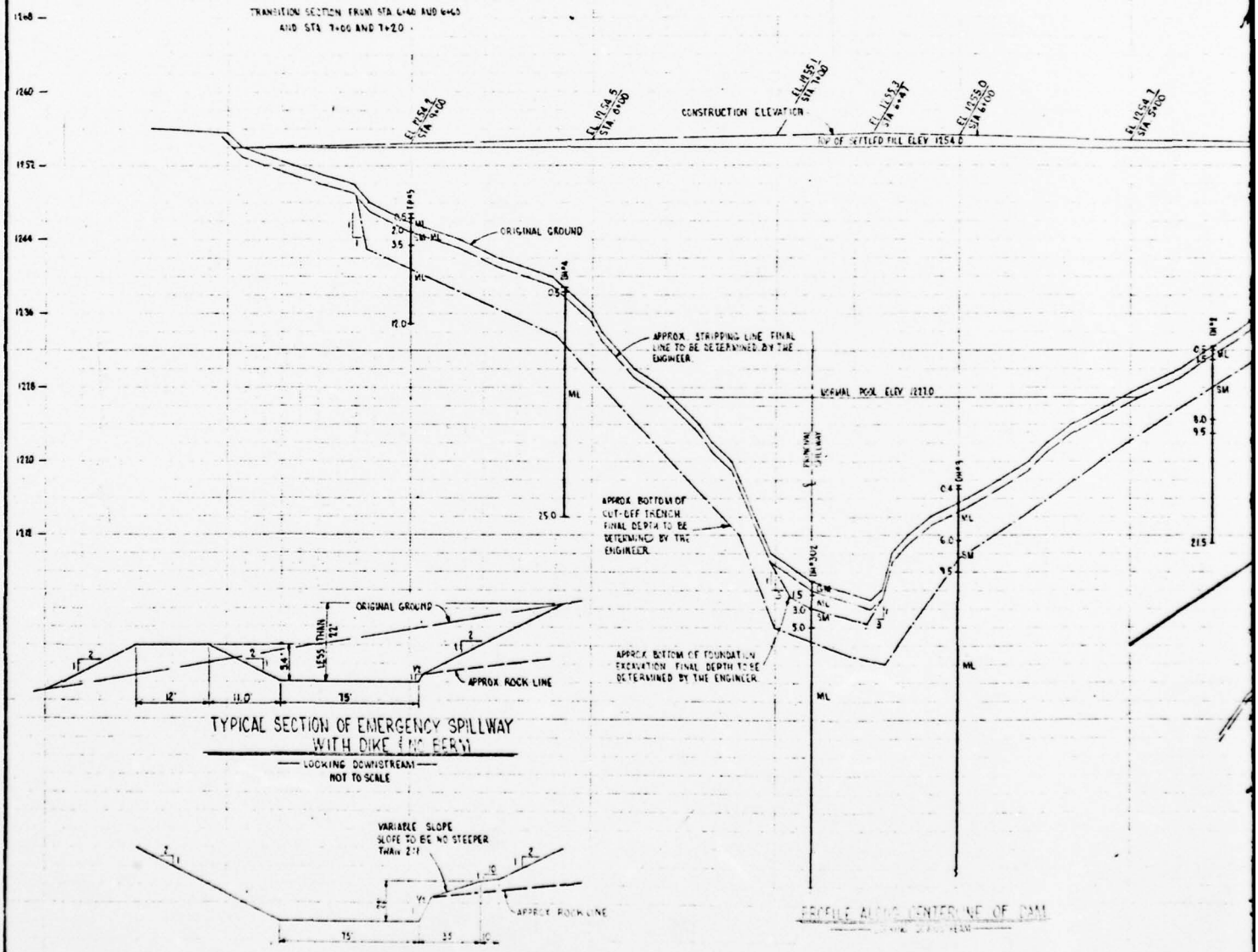
TYPICAL SECTION OF CUT-OFF TRENCH

SECTION BETWEEN STA 5+40 AND 6+40 AND STA 7+20 AND 7+30.

TYPICAL SECTION OF CUT-OFF TRENCH

SECTION BETWEEN STA 6+60 AND 7+00

TRANSITION SECTION FROM STA 6+40 AND 6+60 AND STA 7+00 AND 7+20.



TYPICAL SECTION OF EMERGENCY SPILLWAY WITH DIKE & NO BERM

LOOKING DOWNSTREAM

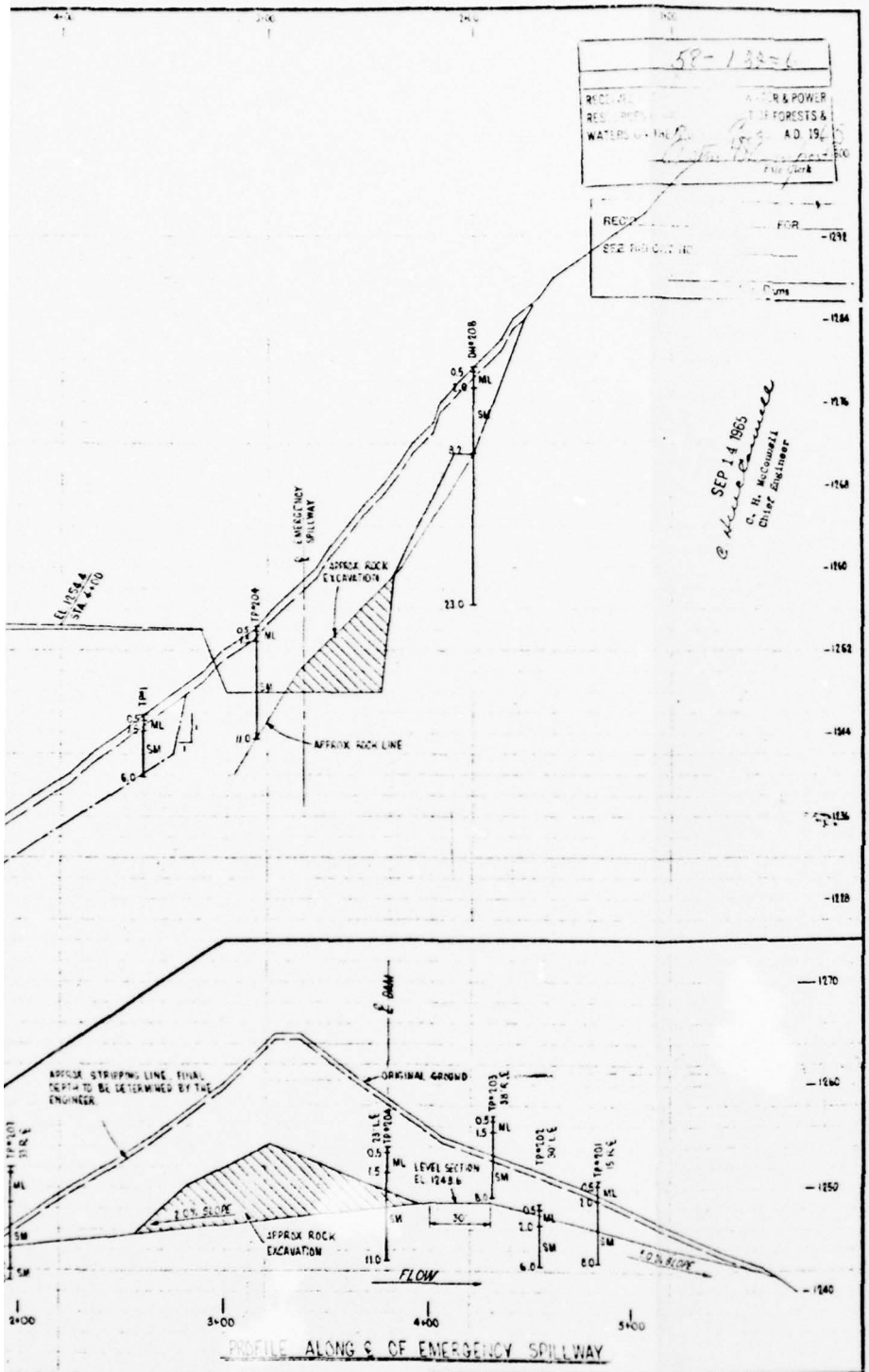
NOT TO SCALE

TYPICAL SECTION OF EMERGENCY SPILLWAY WITH BERM

LOOKING DOWNSTREAM

NOT TO SCALE

PROFILE ALONG CENTERLINE OF DAM



MARTIN CREEK WATERSHED
FLOODWATER RETARDING DAM PA-468
SUSQUEHANNA COUNTY, PENNSYLVANIA
PROFILES - DAM & EMERGENCY SPILLWAY
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

R. A. STALTER 6-65

PA-468-P

Form SCS-216 (November 1955)

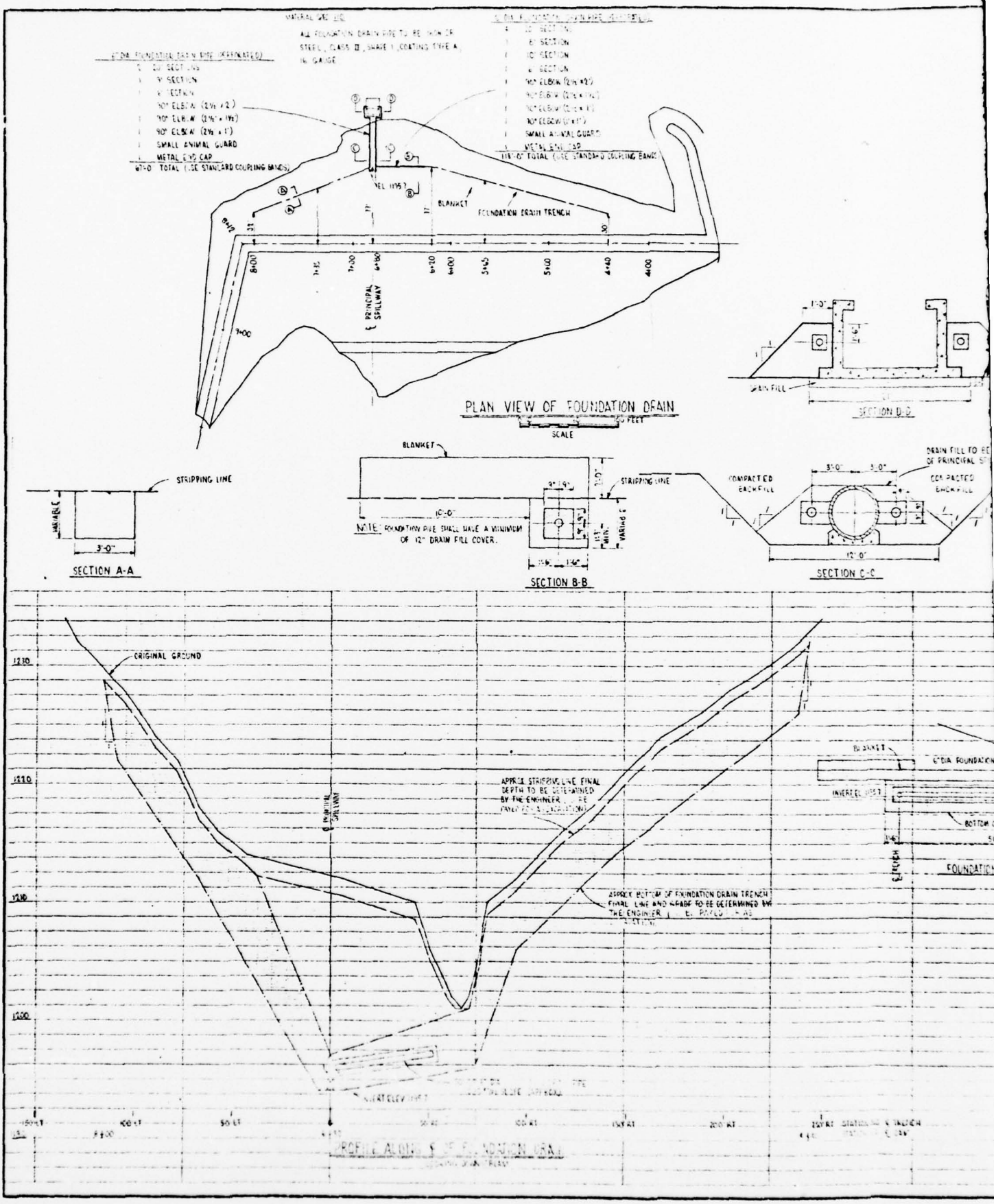
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

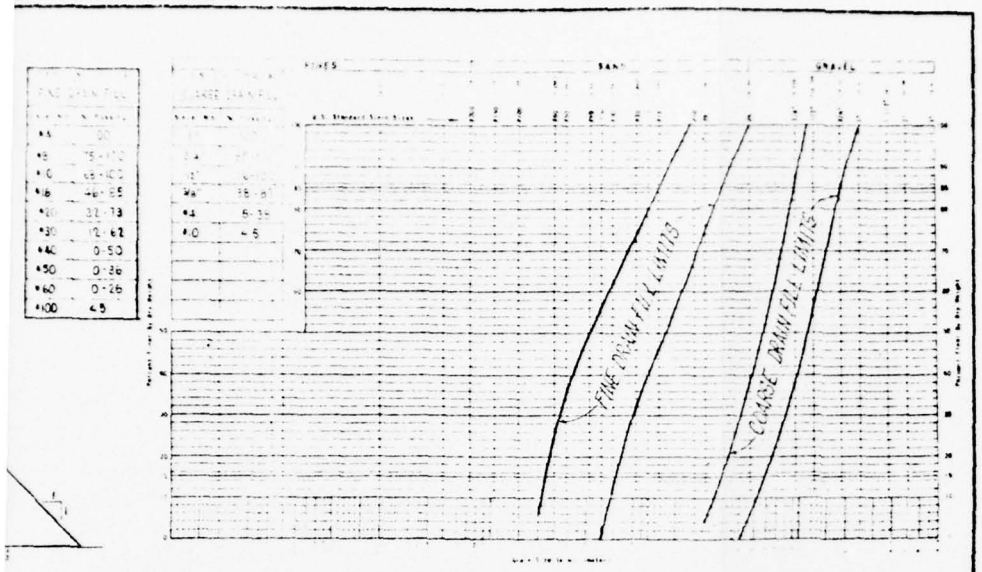
PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

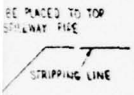
PROFILES

AUGUST 1979 PLATE 4

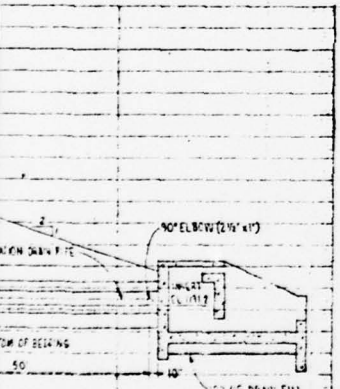

MATERIAL USE
ALL FOUNDATION DRAIN PIPE TO BE NON-CR
STEEL, CLASS II, GRADE I, COATING TYPE A
16 GAUGE
6" DIA. FOUNDATION DRAIN PIPE (PERFORATED)
20' SECTION
9' SECTION
6' SECTION
90° ELBOW (2½ x 2)
90° ELBOW (2½ x 1½)
90° ELBOW (2½ x 1)
SMALL ANIMAL GUARD
METAL END CAP
67'-0" TOTAL (USE STANDARD COUPLING BANDS)
6" DIA. FOUNDATION DRAIN PIPE (PERFORATED)
20' SECTION
6' SECTION
10' SECTION
6' SECTION
90° ELBOW (2½ x 2)
90° ELBOW (2½ x 1½)
90° ELBOW (2½ x 1)
90° ELBOW (2 x 1)
SMALL ANIMAL GUARD
METAL END CAP
118'-0" TOTAL (USE STANDARD COUPLING BANDS)
NEL 1195.7
BLANKET
FOUNDATION DRAIN TRENCH
6+00
7+00
7+50
8+00
8+20
9+00
5+45
5+00
4+40
4+00
℄ PRINCIPAL SPILLWAY
PLAN VIEW OF FOUNDATION DRAIN
SCALE
DRAIN FILL
SECTION D-D
STRIPPING LINE
VARIABLE
3'-0"
SECTION A-A
BLANKET
STRIPPING LINE
10'-0"
NOTE: FOUNDATION PIPE SHALL HAVE A MINIMUM OF 12" DRAIN FILL COVER.
MIN.
VARIABLE
SECTION B-B
COMPACTED BACKFILL
3'-0"
3'-0"
COMPACTED BACKFILL
12'-0"
SECTION C-C
ORIGINAL GROUND
1230
1210
1190
1170
APPROX STRIPPING LINE FINAL DEPTH TO BE DETERMINED BY THE ENGINEER
APPROX BOTTOM OF FOUNDATION DRAIN TRENCH FINAL LINE AND GRADE TO BE DETERMINED BY THE ENGINEER
BLANKET
INVERT EL 1157
BOTTOM
FOUNDATION
PROFILE ALONG ℄ OF FOUNDATION DRAIN

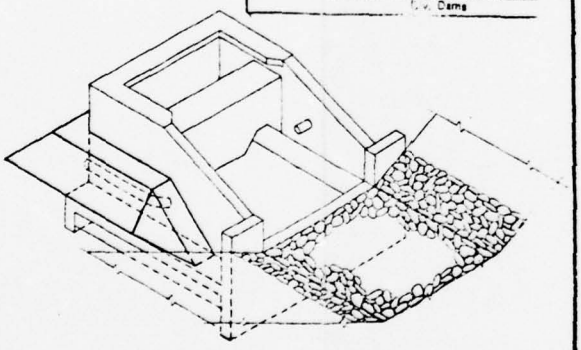


GRADATION LIMITS FOR DRAIN FILL
(SPEC. 105)



FINE DRAIN FILL
COARSE DRAIN FILL





ISOMETRIC OF FOUNDATION DRAIN OUTLET

SEP 14 1965

MARTIN CREEK WATERSHED
FLOODWATER RETARDING DAM PA-468
SUSQUEHANNA COUNTY, PENNSYLVANIA
FOUNDATION DRAIN DETAILS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

R. A. STALTER 5-65

PA-468-P

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

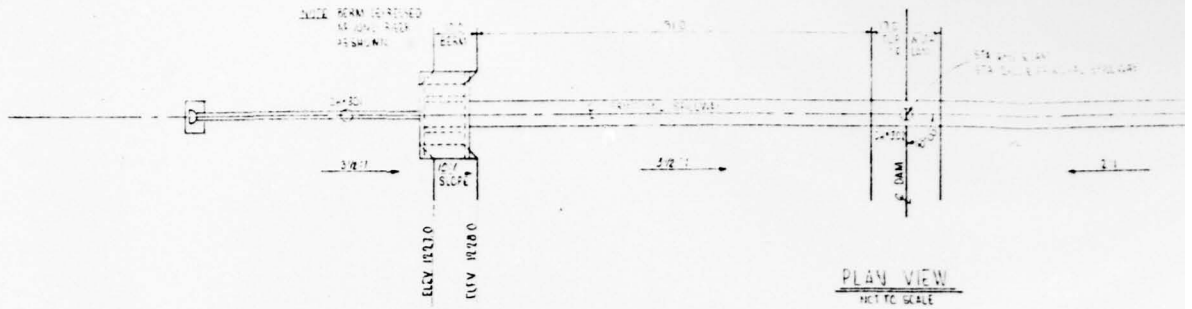
PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

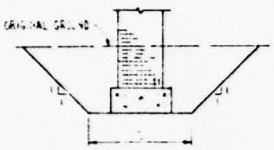
DRAIN PLAN

AUGUST 1979 PLATE 5

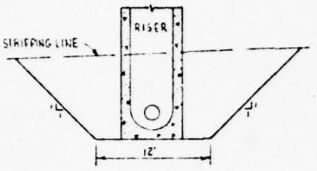
2



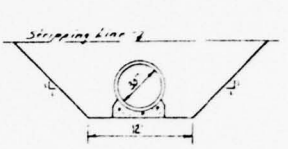
PLAN VIEW
NOT TO SCALE



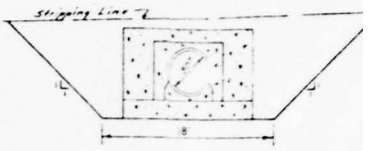
POND DRAIN INLET
NOT TO SCALE



Riser
NOT TO SCALE

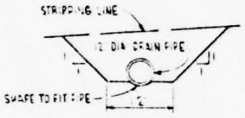


Bedding
NOT TO SCALE

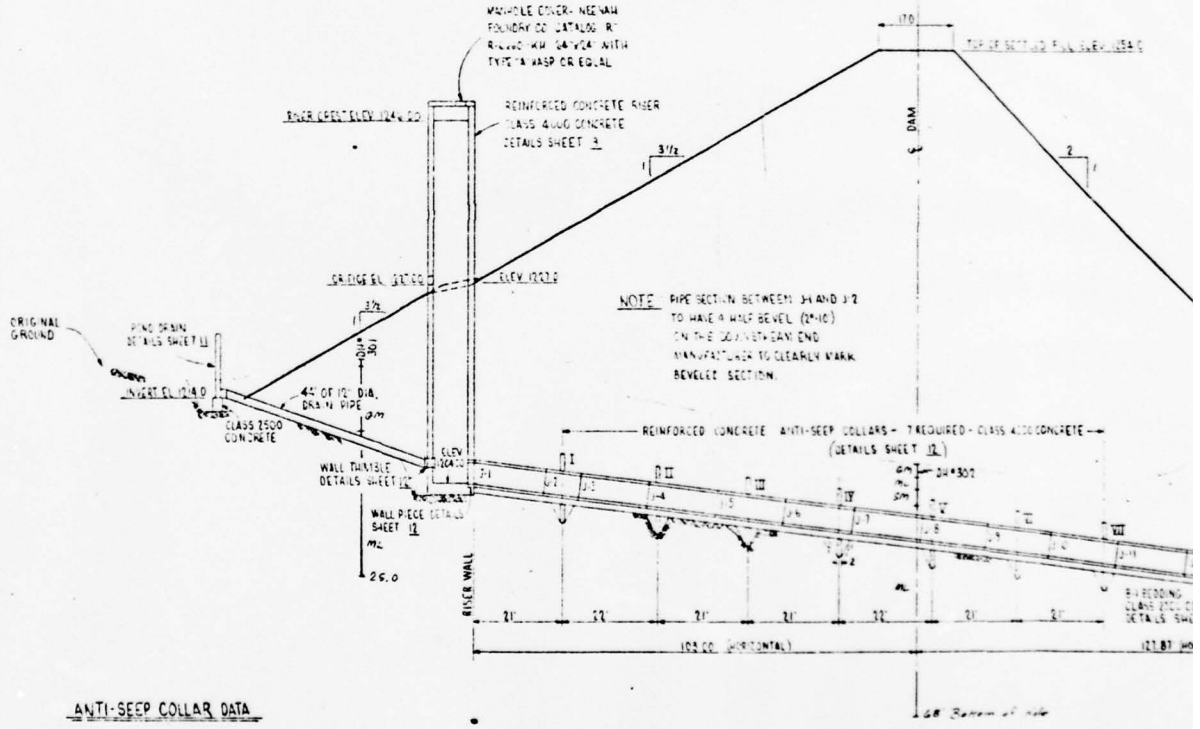


Anti Seep Collars
NOT TO SCALE

TYPICAL SECTIONS
PAY LIMITS FOR EXCAVATION BETWEEN NEAT LINES SHOWN



POND DRAIN
NOT TO SCALE



PROFILE ALONG ℄ OF PRINCIPAL SPILLW

HORIZONTAL SCALE

VERT. SC

PIPE JOINT DATA

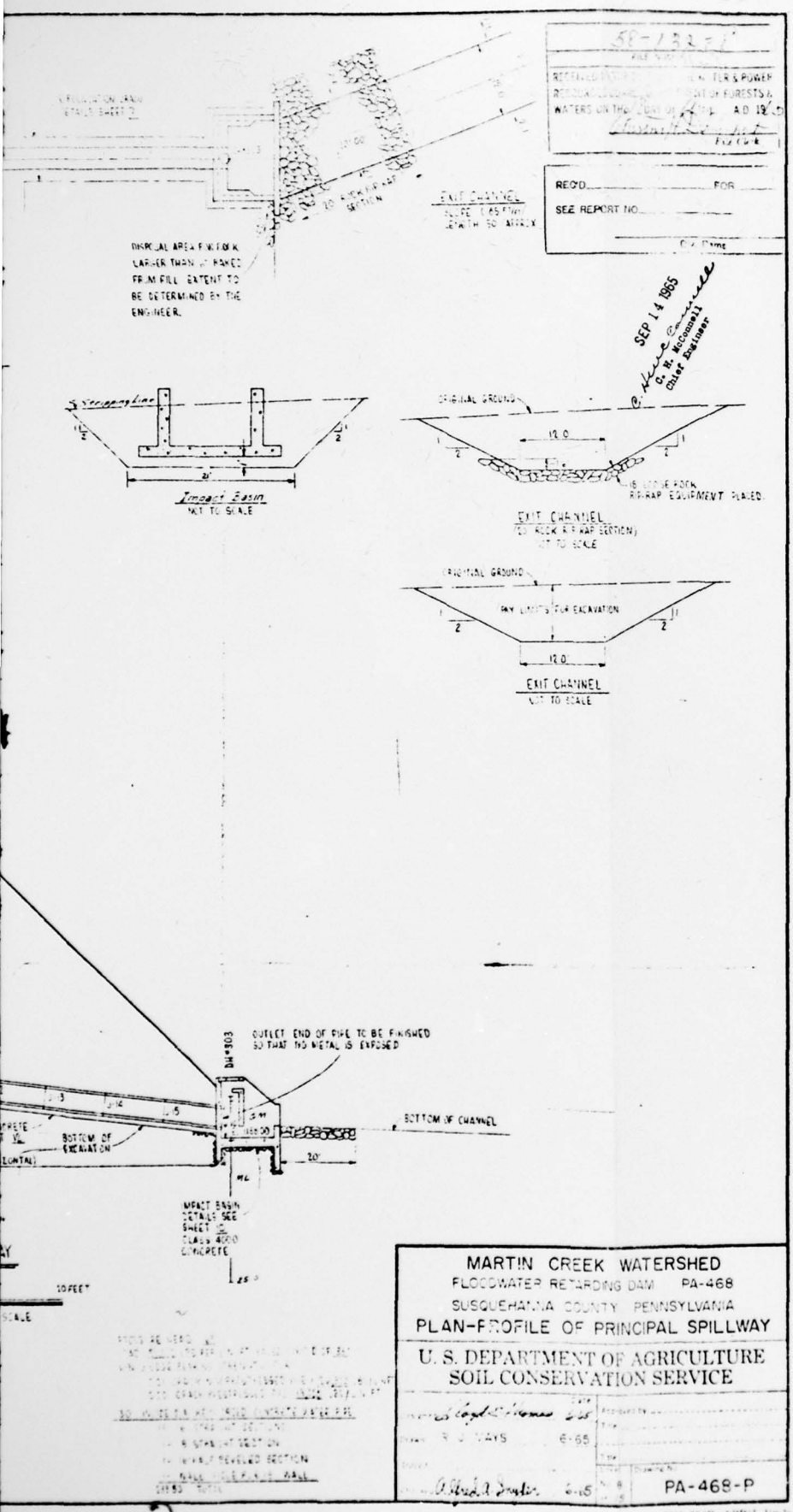
JOINT	DISTANCE FROM RISER	INVERT ELEV OF 30" I.D. WATER PIPE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

ANTI-SEEP COLLAR DATA

COLLAR	DISTANCE FROM RISER	INVERT ELEV OF 30" I.D. WATER PIPE
I	17.0	1203.67
II	41.0	1202.63
III	66.0	1201.64
IV	85.0	1200.84
V	107.0	1199.59
VI	128.0	1198.39
VII	149.0	1197.00

NOTE DIMENSIONS OF PIPE ARE BASED ON NOMINAL SIZE AND DO NOT INCLUDE CREEP

SEE SHEETS [illegible] FOR [illegible]



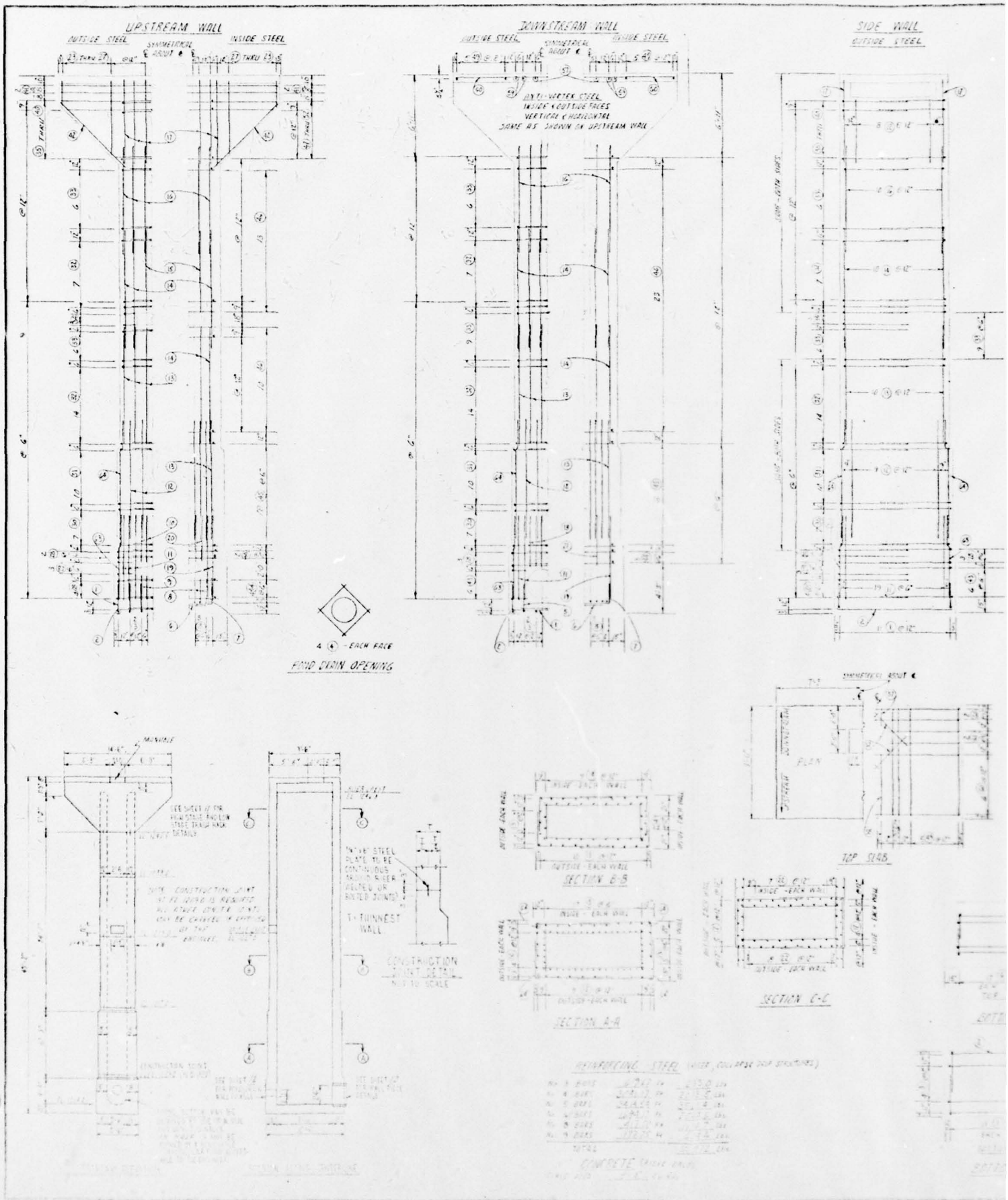
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

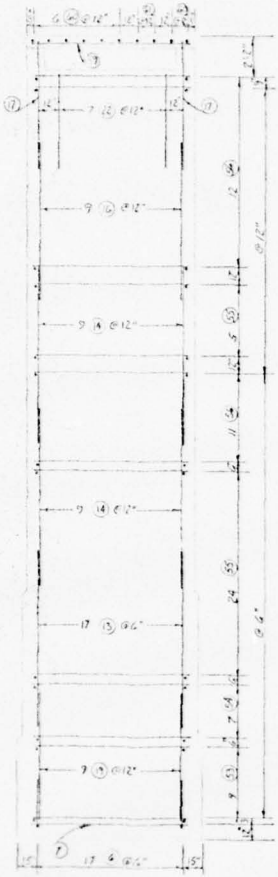
MAIN SPILLWAY AND OUTLET WORKS

AUGUST 1979 PLATE 6


UPSTREAM WALL
OUTSIDE STEEL
INSIDE STEEL
SYMMETRICAL ABOUT ℄
DOWNSTREAM WALL
OUTSIDE STEEL
INSIDE STEEL
SYMMETRICAL ABOUT ℄
ANTI-WEBER STEEL
INSIDE & OUTSIDE FACES
VERTICAL & HORIZONTAL
SAME AS SHOWN IN UPSTREAM WALL
SIDE WALL
OUTSIDE STEEL
4 ⑥ - EACH FACE
FIND DRAIN OPENING
SYMMETRICAL ABOUT ℄
PLAN
TOP SLAB
MANHOLE
SEE SHEET 11 FOR PENSTOCK ENCLOSURE STRUCTURAL DETAILS
SITE CONSTRUCTION JOINT
"INVAR" STEEL PLATE TO BE CONTINUOUS ACROSS RIVER PACKED OR RIVETED JOINTS
T = THINNEST WALL
CONSTRUCTION JOINT DETAIL
NOT TO SCALE
SECTION B-B
SECTION A-A
SECTION C-C
REINFORCING STEEL (UNDER COLLAPSE LOAD STRUCTURES)
CONCRETE

SIDE WALL

INSIDE STEEL



BAR TYPES

STEEL SCHEDULE

MARK	LOCATION	NO. OF BARS	SIZE	LENGTH	NO.	A	B	C	TOTAL FT
1	5.0" x 3/8"	22	5	5'-4"	2	3'-4"	2'-0"		117.33
2		2	4	10'-0"	1				20.00
3		4	4	12'-0"	2	1'-0"	2'-0"		48.00
4		2	5	7'-0"	1				14.00
5		2	4	3'-7"	2	1'-7"	2'-0"		7.17
6		34	4	3'-8"	2	2'-2"	1'-6"		124.67
7		2	4	8'-0"	1				16.00
8		5	4	10'-0"	2	8'-0"	2'-0"		50.00
9	VERTICAL	3	3	1'-9"	1				5.25
10		3	3	3'-1"	4	1'-6"	0'-4"	1'-3"	9.25
11		43	3	6'-1"	4	4'-3"	0'-4"	1'-6"	292.00
12		26	4	7'-4"	4	7'-6"	0'-4"	1'-6"	142.67
13		70	4	9'-3"	1				647.50
14		67	5	9'-7"	1				642.07
15		4	8	6'-4"	1				25.33
16		48	5	9'-1"	1				436.00
17		22	5	7'-1"	1				155.83
18		5	3	3'-4"	4	1'-6"	0'-4"	1'-6"	16.67
19		23	6	6'-3"	1				125.00
20		3	6	3'-0"	1				9.00
21		2	6	3'-10"	1				7.67
22		50	5	5'-3"	1				157.50
23		8	5	2'-0"	1				16.00
24		8	5	3'-0"	1				24.00
25		8	5	4'-0"	1				32.00
26		8	5	5'-0"	1				40.00
27		8	5	6'-0"	1				48.00
28	HORIZONTAL	3	3	0'-6"	2	5'-6"	3'-0"		153.00
29		3	3	6'-9"	2	5'-6"	1'-3"		47.50
30		128	8	9'-6"	2	6'-0"	3'-6"		266.00
31		40	6	7'-0"	2	5'-9"	3'-3"		350.00
32		44	6	8'-6"	2	5'-6"	3'-0"		714.00
33		64	5	8'-2"	2	5'-4"	2'-10"		441.00
34		6	5	6'-3"	2	5'-4"	0'-11"		37.50
35		4	5	9'-10"	2	5'-4"	4'-6"		39.33
36		4	5	10'-10"	2	5'-4"	5'-6"		43.33
37		4	5	11'-10"	2	5'-4"	6'-6"		47.33
38		4	5	12'-10"	2	5'-4"	7'-6"		51.33
39		4	5	13'-10"	2	5'-4"	8'-6"		55.33
40		4	5	14'-4"	2	5'-4"	9'-0"		57.33
41		6	5	14'-0"	1				112.00
42		8	5	7'-3"	1				58.00
43		12	3	6'-6"	2	5'-6"	1'-0"		78.00
44		9	4	3'-3"	1				29.25
45		36	4	3'-3"	1				117.00
46		46	5	3'-3"	1				149.50
47		2	5	5'-0"	1				10.00
48		2	5	7'-0"	1				14.00
49		12	5	9'-0"	1				108.00
50		2	5	11'-0"	1				22.00
51		2	5	13'-0"	1				26.00
52		2	5	14'-0"	1				28.00
53		18	4	8'-3"	1				148.50
54		14	4	8'-3"	1				115.50
55		58	4	8'-3"	1				478.50
56		46	5	8'-3"	1				379.50
57	TOP SLAB	2	5	1'-6"	1				3.00
58		2	5	5'-0"	1				10.00
59		4	4	2'-0"	1				8.00
60		8	4	14'-0"	1				112.00
61		4	4	5'-9"	1				23.00
62		4	5	3'-6"	1				14.00
63	DIAGONAL	4	3	6'-3"	4	4'-3"	0'-6"	1'-6"	25.00
64		4	4	9'-6"	4	7'-6"	0'-6"	1'-6"	38.00
65	COLUMNS	10	4	7'-0"	1				470.00
66		10	4	3'-8"	1				245.33
67		10	4	1'-6"	1				100.50
68		10	4	1'-6"	1				100.50
69		10	4	1'-2"	1				80.33
70	MISCELLANEOUS	4	4	13'-6"	1				270.00
71		42	4	5'-6"	1				231.00

SEE SHEET 12 FOR GENERAL NOTES

0 1 2 3 4 5 10 FEET

RECEIVED IN THE OFFICE OF THE WATER RESOURCES BOARD DEPARTMENT OF FOR FILE NUMBER PA-468-7 WATERS ON THE 14 DAY OF AUG 65

RECD. _____ FOR _____

SEE REPORT NO. _____ Dir. Dam. _____

SEP 14 1965

C. Hue R. Brenner
REGIONAL Chief Engineer

MARTIN CREEK WATERSHED
FLOODWATER RETARDING DAM PA-468
SUSQUEHANNA COUNTY, PENNSYLVANIA
STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DRAWN J. R. MAYS 6-65

PA-468-P

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

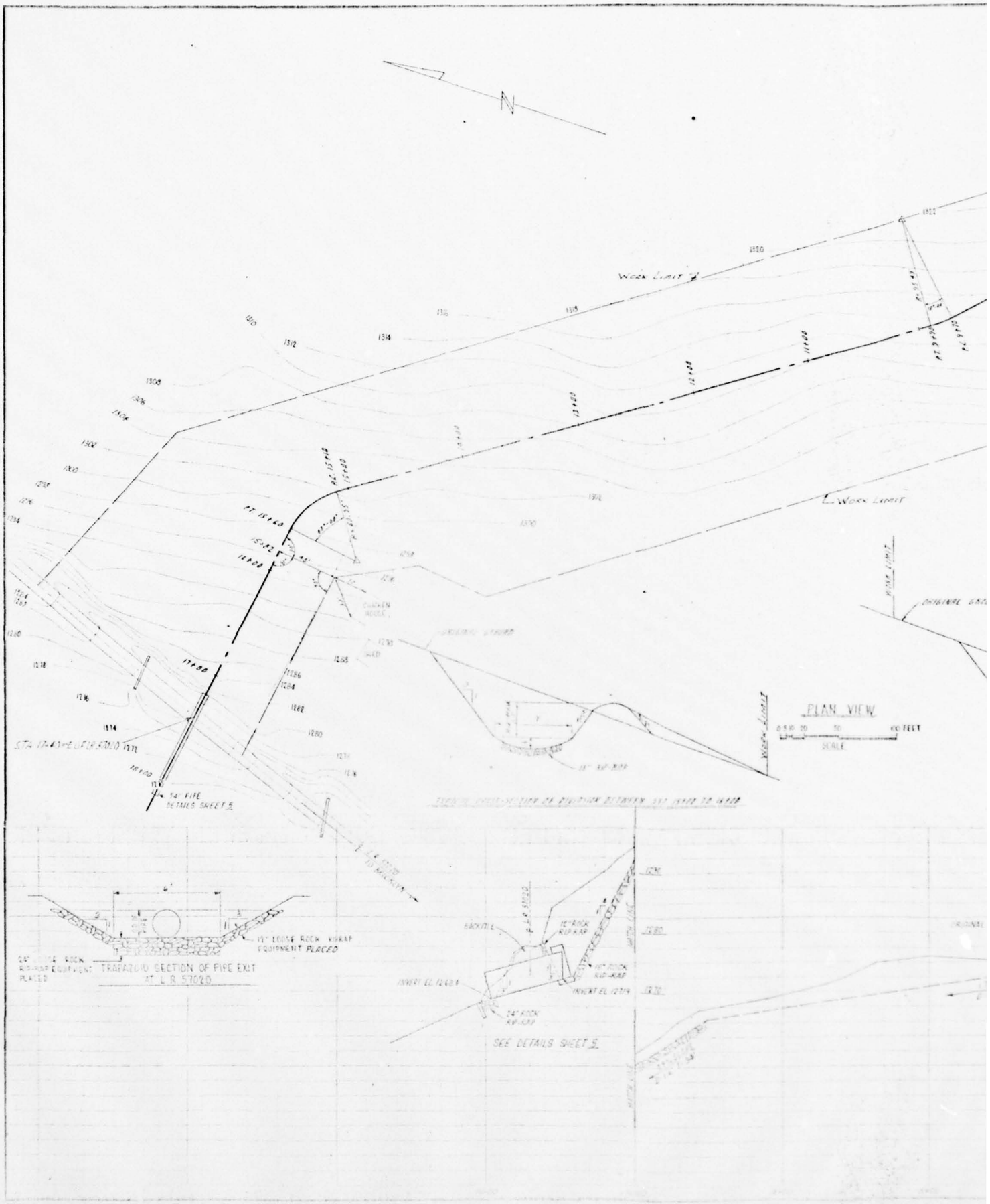
PA-468 DAM

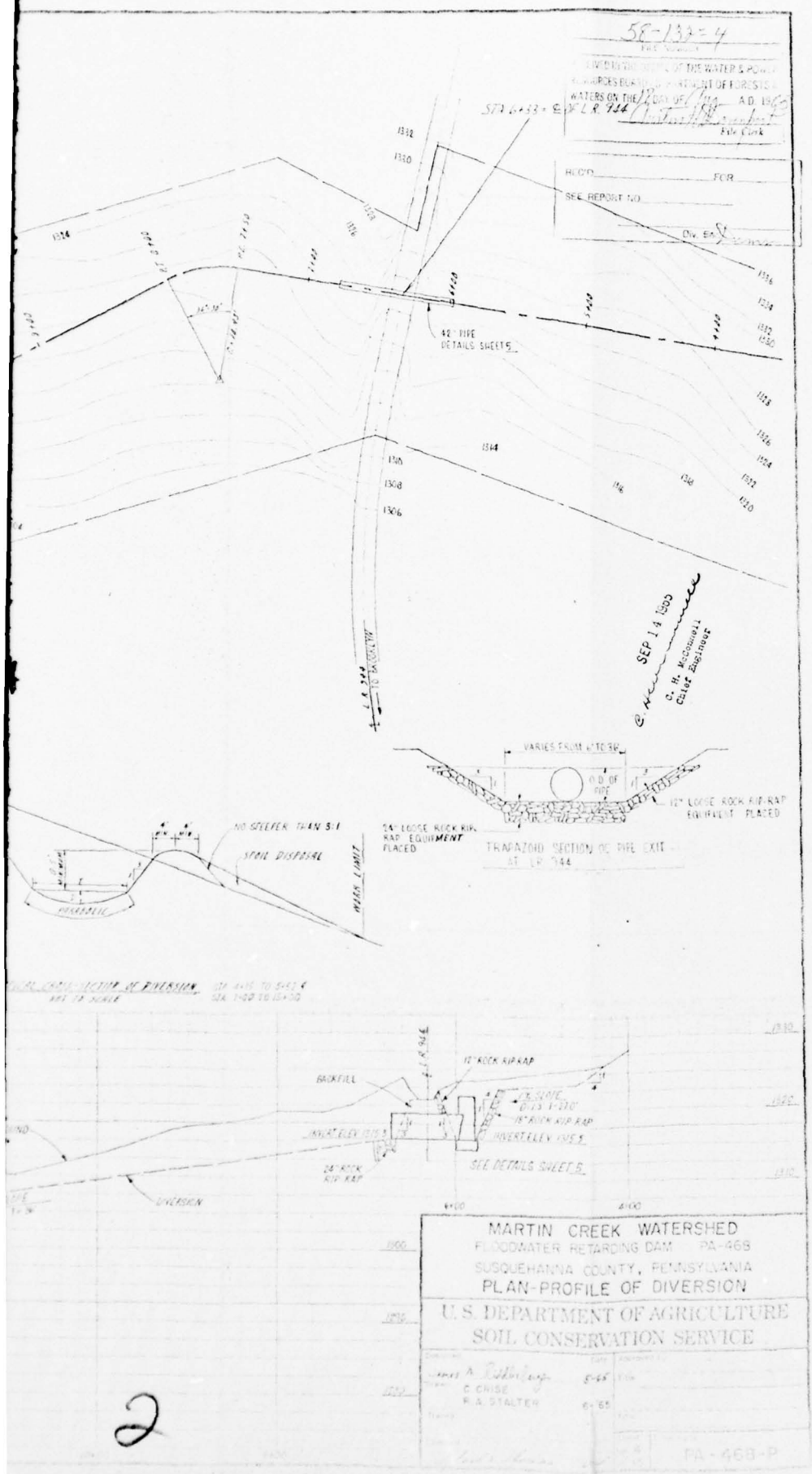
SUSQUEHANNA COUNTY COMMISSIONERS

MAIN SPILLWAY RISER

AUGUST 1979 PLATE 7

2


N
Work Limit
Work Limit
PLAN VIEW
SCALE
14" PIPE
DETAILS SHEET 5
TRAPEZOID SECTION OF PIPE EXIT
AT L.B. 57020
BACKFILL
SEE DETAILS SHEET 5



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

DIVERSION SYSTEM

AUGUST 1979 PLATE 8

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1979

APPENDIX A

CHECKLIST- ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: PA-468 Dam

NDI ID NO.: PA-00056 DER ID NO.: 58-132

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	Complete set of design drawings available. As-built conditions shown in SCS files.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	Constructed 1966 - 1967 by Susquehanna County Commissioners.
TYPICAL SECTIONS OF DAM	See Plate 2.
OUTLETS: Plan Details Constraints Discharge Ratings	See Plates 3, 6, and 7. See Appendix C for discharge ratings.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	None.
DESIGN REPORTS	Complete design folder in SCS files. Each section marked "void" except hydrology and hydraulics section.
GEOLOGY REPORTS	Geologic report in design folder. Summary presented in Appendix E.
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	Complete H & H computations. Stability analysis for embankment. No seepage studies.
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	Complete investigation.
POSTCONSTRUCTION SURVEYS OF DAM	None.

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	Shown on Plate 2.
MONITORING SYSTEMS	None.
MODIFICATIONS	None.
HIGH POOL RECORDS	None.
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	None.

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	Annual operation and maintenance inspection reports by SCS.
SPILLWAY: Plan Sections Details	See Plates 3, 6 and 7.
OPERATING EQUIPMENT: Plans Details	Available.
PREVIOUS INSPECTIONS Dates Deficiencies	1970: No deficiencies. 1971: No deficiencies. 1972: No deficiencies. 1973: No deficiencies. 1974: No deficiencies. 1975: No deficiencies. 1976: No deficiencies.
	1977: Impact basin wall chipped; brush in diversion inlet; fence cut. 1978: Impact basin wall chipped; brush in diversion inlet.

3010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Craig M. Right, State Conservation Engineer, SCS, Harrisburg, Pennsylvania 17101 DATE: April 30, 1965

FROM : Rey S. Decker, Head, Soil Mechanics Laboratory, SCS, Lincoln, Nebraska 68508

SUBJECT: ENG 22-5, Pennsylvania WP-08, Martin's Creek, Site No. PA-468 (Susquehanna County)

ATTACHMENTS

1. Form SCS-354, Soil Mechanics Laboratory Data, 1 sheet.
2. Form SCS-355, Triaxial Shear Test Data, 1 sheet.
3. Form SCS-352, Compaction and Penetration Resistance Report, 3 sheets.
4. Form SCS-353, Filter Design, 1 sheet.
5. Investigational Plans and Profiles.

DISCUSSION

FOUNDATION

A. Classification: The foundation material at this site consists primarily of a dense glacial till that is logged as ML.

Bedrock was encountered in DH 2 at ℄ Station 4+50 on the left abutment. The bedrock drops off sharply left of ℄ Station 4+50. In DH 302 bedrock was encountered at a 68-foot depth. DH 302 is in the bottom of the valley at ℄ Station 6+80.

Bedrock was not encountered at the investigational depths on the left abutment.

Samples submitted from Test Hole 602 are classified GC-GM and SC-SM

B. Blow Count: The till is relatively dense as indicated by blow count tests. Tests below water table resulted in blow counts generally in excess of 40 blows/ft.

The GM and SM alluvium in DH 301, 302 and 303 had blow counts ranging from 18 to 65 blows/ft.

The lake sediment behind the small dam has a low blow count of 2 blows/ft.

C. Shear Strength and Consolidation: The blow count tests indicate a foundation with high strength and low consolidation potential.

D. Permeability: Field permeability tests were made and are reported in the site investigational report.

2 -- Craig M. Right -- 4/30/65
Rey S. Decker
Subj: ENG 22-5, Pennsylvania WP-08, Martin's Creek, Site No. PA-468
(Susquehanna County)

EMBANKMENT

A. Classification: The samples submitted from the emergency spillway and from the borrow area are sandy and gravelly materials that are classed as SM and GM. The samples contain from about 25 to 40 percent gravel and 20 to 40 percent fines. The liquid limits are less than 20 and the PI's are less than 3.

B. Compacted Density: Standard Proctor compaction tests were made on the minus No. 4 fraction. The compacted densities obtained ranged from 123 p.c.f. to 128 p.c.f.

C. Shear Strength: A triaxial shear test was made on Sample 65W2462 to represent the materials submitted. The test was made on the minus No. 4 fraction compacted to 95 percent of standard Proctor density. The test was made at saturation and the consolidated, undrained values obtained were $\phi = 32°$, $c = 0$. The test values are considered to be representative of these materials for a placement density of 95 percent of standard Proctor and are suggested for design.

D. Permeability: A permeability test was made on the minus No. 4 fraction compacted to 95 percent of standard Proctor density. The test was made under a 2000 p.s.f. load and the permeability rate obtained was 0.02 ft./day.

SLOPE STABILITY

The stability of the upstream slope was checked with an infinite slope method of analysis. The factor of safety for a 3:1 slope is 0.94 considering horizontal flow lines, and $F_s = 1.03$ considering parallel flow lines.

A 3 1/2:1 upstream slope has a factor of safety of 1.12 considering horizontal flow and $F_s = 1.20$ considering parallel flow.

The proposed 2:1 downstream slope was checked with an infinite slope (dry slope condition) analysis and the factor of safety obtained was 1.25.

The factor of safety obtained for the 2:1 downstream slope with a sliding wedge method of analysis was 3.0. This analysis considered a drain at $c/b = 0.6$.

SETTLEMENT ANALYSIS

With the exception of the small dam and the recent lake sediment the consolidation potential of the foundation material is expected to be low and differential settlement is not expected to be a problem.

3 -- Craig M. Right -- 4/30/65
Rey S. Decker
Subj: ENG 22-5, Pennsylvania WP-08, Martin's Creek, Site No. PA-468
(Susquehanna County)

RECOMMENDATIONS

A. Foundation Preparation: We concur with the proposal to remove the small dam and the recent lake sediment behind it. The lake sediment is a 2 blow/ft. material. Normal site preparation is expected to be adequate for the rest of the foundation.

B. Cutoff Trench: A shallow cutoff trench is suggested. A minimum trench depth of 5 feet is recommended to insure that the trench bottoms below the zone affected by roots, rodents, cracking, etc. The trench backfill should consist of the most plastic material available compacted to a minimum of 95 percent of standard Proctor density with the control based on the minus 4 fraction.

C. Principal Spillway: The proposed location is in the bottom of the narrow V-shaped valley. At this location dense till occurs at a depth of less than 8 feet and the conduit can be bedded directly on the till throughout its entire length. Placement in this manner would provide a uniform foundation on essentially a non-yielding foundation.

If the conduit is not bedded on till at this location, over-excavation and backfill will probably be required in order to obtain a uniform foundation.

D. Drain: A drain is recommended to control the phreatic line in the embankment and also to provide a safe outlet for underseepage.

Positive control of the phreatic line is required with the proposed 2:1 downstream slope. Therefore, we recommend a partial blanket drain in conjunction with a shallow trench drain. The trench drain should have a minimum depth of 5 feet and should be located at about c/b = 0.6. The blanket drain should extend upstream from the trench drain. A blanket width in the range of 10 feet is suggested.

The suggested filter limits are shown on the attached Form SCS-353.

E. Embankment Design:

1. Placement of Materials. The materials from the borrow area and from the emergency spillway are very similar and the materials from both sources may be used anywhere in the fill.

Although some of the material will contain slightly more than 35 percent gravel, we recommend that the density control be based on the minus 4 fraction in order to insure uniform permeability in the embankment.

V

4 -- Craig M. Right -- 4/30/65
Rey S. Decker
Subj: ENG 22-5, Pennsylvania WP-08, Martin's Creek, Site No. PA-468
(Susquehanna County)

All of the embankment material should be placed at a minimum of 95% of standard Proctor density with the control based on the minus 4 fraction.

The placement moisture content should be on the wet side of optimum.

2. Slopes. On the basis of the test data and stability analyses, the following slopes are required in order to obtain acceptable factors of safety.

a. Upstream - 3 1/2:1.

b. Downstream - 2:1 with control of the phreatic line.

F. Settlement: An overfill allowance of 1.25 ft. $\frac{1.25}{45} \approx 2.5\%$ is suggested to compensate for residual consolidation within the fill and the foundation.

Prepared by:

Lorn P. Dunnigan

Reviewed and Approved by:

Roland B. Phillips

Attachments

cc: Craig M. Right (5)
H. M. Kautz, Upper Darby, Pa. (2)

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1979

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: PA-468 Dam County: Susquehanna State: Pennsylvania

NDI ID No.: PA-00056 DER ID No.: 58-132

Type of Dam: Homogeneous earthfill. Hazard Category: High

Date(s) Inspection: 18 July 1979 Weather: Overcast Temperature: 70°

Rain during inspection.

Pool Elevation at Time of Inspection: 1227.1 msl/Tailwater at Time of Inspection: 1190.0 msl

Inspection Personnel:

D.A. Wolf (GFCC)

D.R. Ebersole (GFCC)

D.B. Wilson (GFCC) Recorder

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None apparent.	Upstream slope has heavy grass cover; downstream slope has crownvetch cover.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	None.	
CREST ALIGNMENT: Vertical Horizontal	See survey data at end of Appendix B.	
RIPRAP FAILURES	No riprap.	Thick grass cover on upstream slope.

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	No deficiencies.	
ANY NOTICEABLE SEEPAGE	None.	
STAFF GAGE AND RECORDER	None.	
DRAINS	6-inch BCCMP outlet at each side of impact basin.	Slight clear discharge from each outlet: Left outlet ≈ 0.3 gpm Right outlet : slight trickle
MISCELLANEOUS	2 small shrubs on downstream slope	

OUTLET WORKS (MAIN SPILLWAY AND OUTLET WORKS)

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet conduit in good condition. Joint separation increases progressively toward maximum section.	30-inch diameter concrete conduit. Maximum joint opening approx. 1" and located near ℄ of dam.
INTAKE STRUCTURE (Riser)	Concrete and metals in good condition.	
OUTLET STRUCTURE (Impact Basin)	Minor spalling of concrete on inside left wall; large rocks in basin; conduit separated from headwall slightly.	Slight clear flow visible where outlet conduit is separated from headwall.
OUTLET CHANNEL	No deficiencies.	
EMERGENCY GATE	No gates.	Could not inspect bolted closure at end of 12" ϕ steel pipe due to flow of water.

UNGATED SPILLWAY (AUXILIARY SPILLWAY)

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None.	
APPROACH CHANNEL	Minor amount of brush.	
DISCHARGE CHANNEL	No deficiencies.	
BRIDGE AND PIERS	None.	

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Generally steep and grass covered.	No signs of instability.
SEDIMENTATION	No known problems.	
WATERSHED DESCRIPTION	Approximately 95% farmland.	Reservoir area used as pasture.
DIVERSION SYSTEM	Generally in good condition, but the inlet area for 54-inch pipe had heavy brush.	

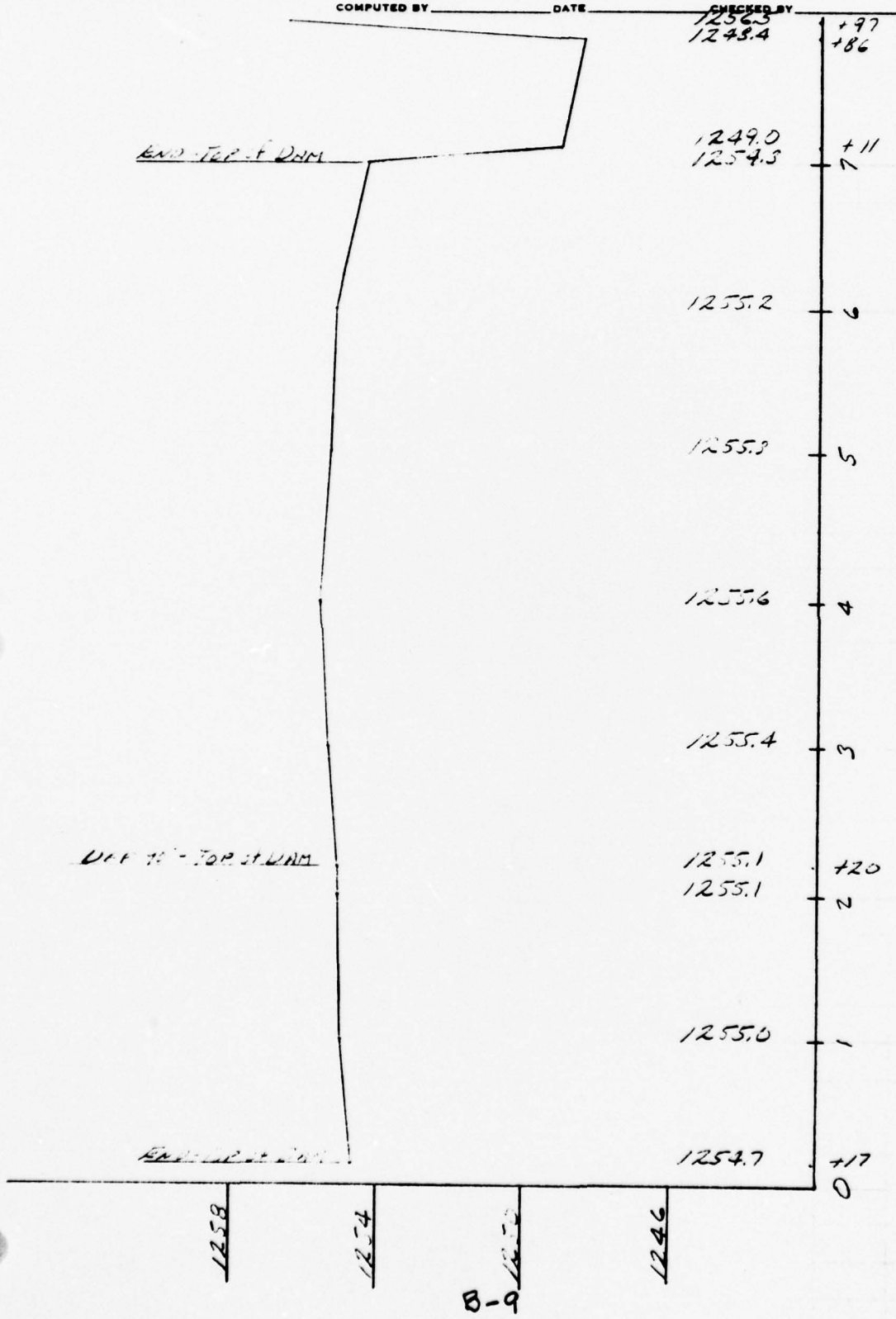
DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	No obstructions; V- shaped valley.	
SLOPES	Steep.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Community of Brooklyn located 0.1 mile downstream.	Approx. 25 low-lying dwellings located in Brooklyn.

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT PA No 468 Dam
PROFILE - TOP of DAM
FILE NO.
SHEET NO. ___ OF ___ SHEETS
FOR
COMPUTED BY ___ DATE ___ CHECKED BY ___ DATE ___

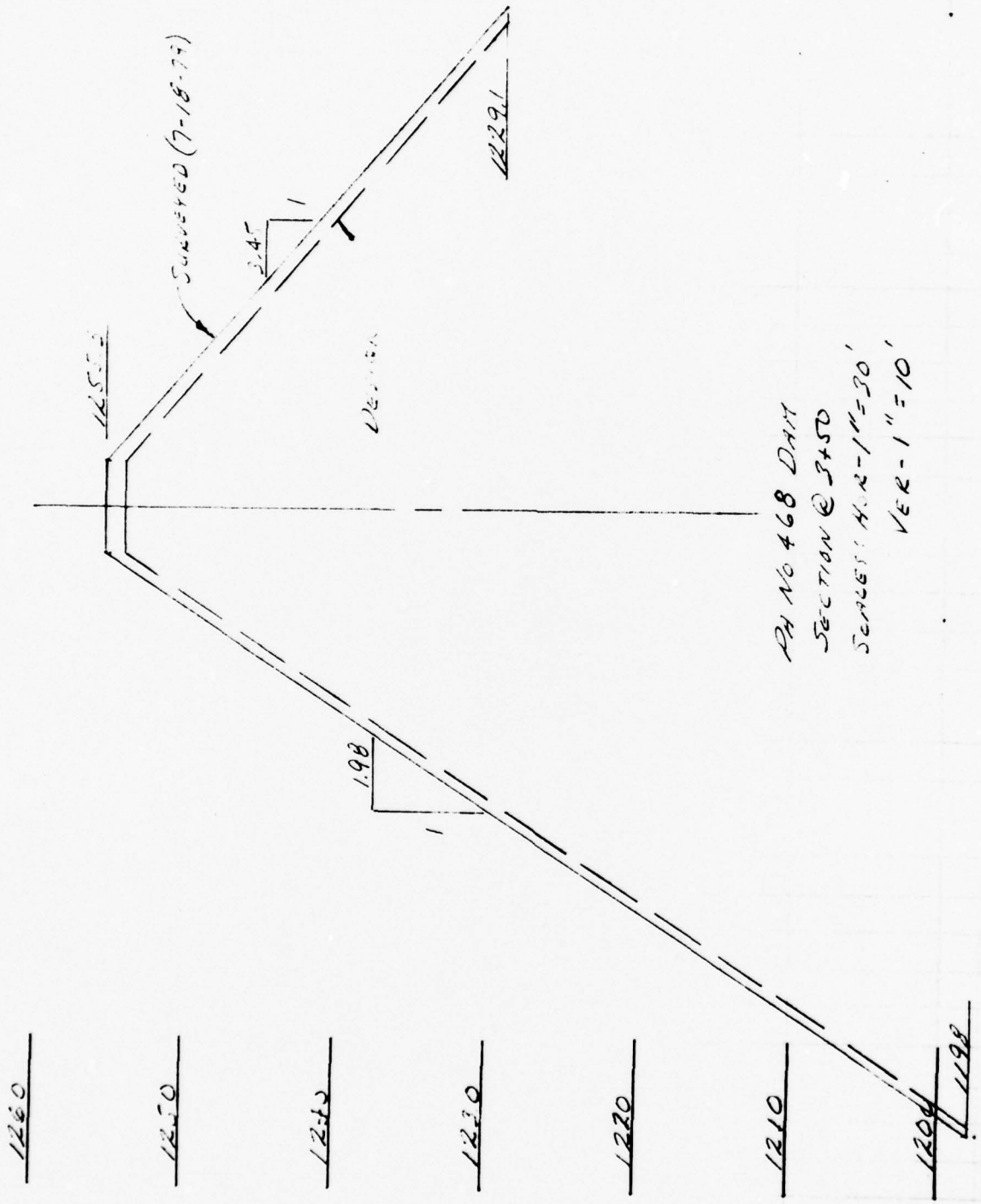


PA No. 468 DAM
PROFILE - TOP of DAM
SCALES: HOR - 1" = 100'
VER - 1" = 4'

6313

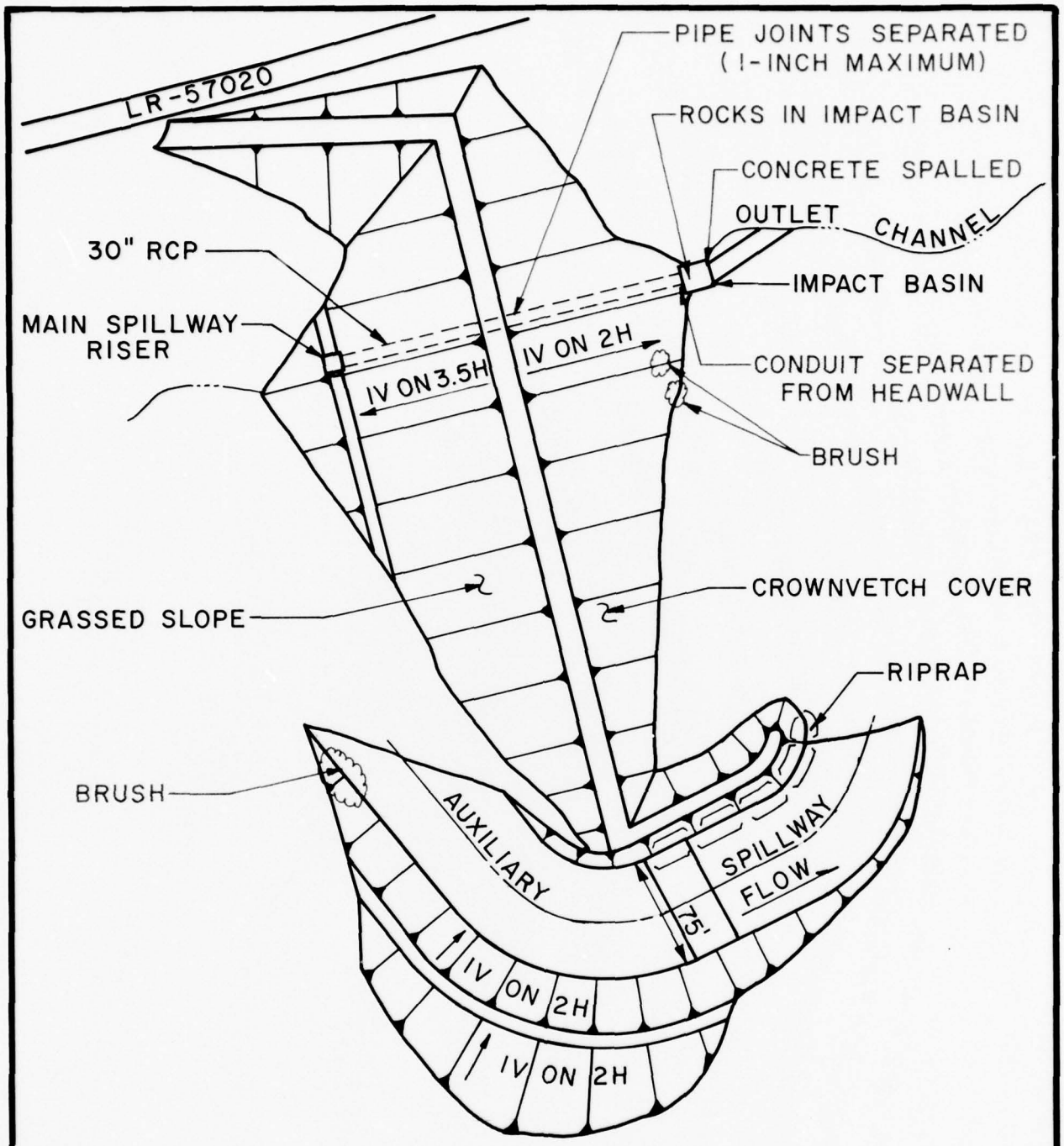
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT: PA No 468 Dam
Section @ 3+50
FILE NO.
SHEET NO. ___ OF ___ SHEETS
FOR
COMPUTED BY ___ DATE ___ CHECKED BY ___ DATE ___



PA No 468 Dam
Section @ 3+50
Scales: Hor. 1" = 30'
Ver. 1" = 10'

6313



NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

RESULTS OF VISUAL INSPECTION

AUGUST 1979 PLATE B-1

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1979

APPENDIX C

HYDROLOGY AND HYDRAULICS

APPENDIX C

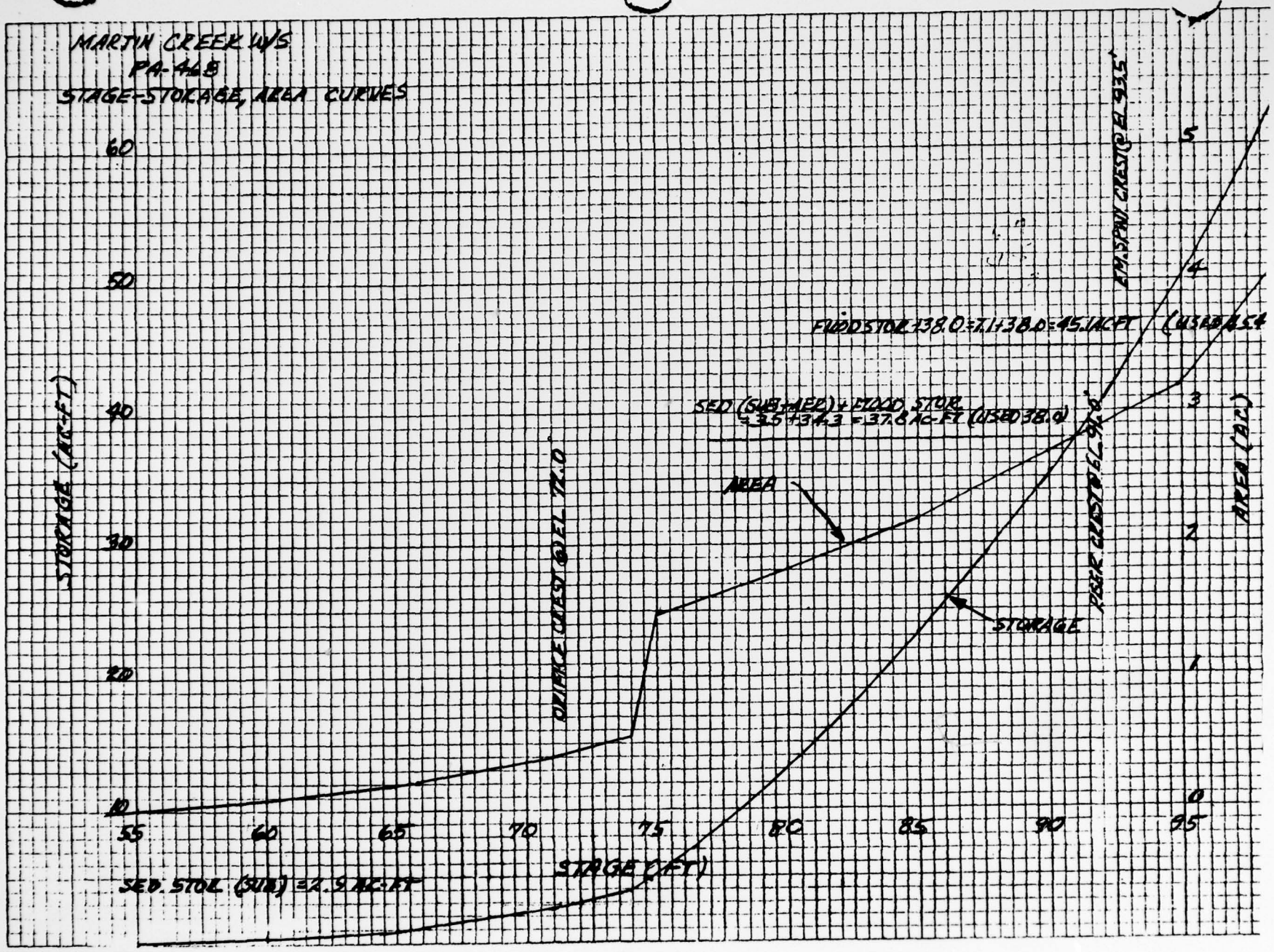
HYDROLOGY AND HYDRAULICS

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.



1/13/59 FREEBOY

HYDROGRAPH COMPUTATION FORM

Watershed MARTIN CREEK State PA.

Structure Site or Sub-area #1

Storm Distribution Curve 23 Hydrograph Family 1

D.A. 0.378 sq.mi. Pt. Rainfall 25.0 (2.5 x 10) inches Aerial Rainfall 24.5 inches

R.O. Condition II R.O. Curve No. 77 Storm Duration or Freq. 6 hr.

T_c = .71 hrs. Q = 21.2 inches T_p = 0.686 T_c = .5 T_o = 5.6 hr.

$\frac{T_o}{T_p}$ Computed = 11.2 $\frac{T_o}{T_p}$ used: 10 Revised T_p = .56 hr.

$Q_p = \frac{484\ A}{Rev.\ T_p}$ = 327 c.f.s. q_p x Q = 6940 c.f.s.

T (Column) = $\frac{t}{T_p}$ x Rev. T_p q (Column) = $\frac{q_c}{q_p}$ (q_p Q)

Check: $Q = \frac{(\Delta t)(\Sigma q)}{645\ A}$

Table 3.21-7 (Sheet 25 of 52)

Line No.	$\frac{t}{T_p}$	$\frac{q_c}{q_p}$	T hours	Q c.f.s.	Line No.	$\frac{t}{T_p}$	$\frac{q_c}{q_p}$	T hours	Q c.f.s.
1	0	0	0	0	21				
2	.56	.002	.31	14	22				
3	1.12	.013	.63	90	23				
4	1.68	.027	.94	187	24				
5	2.24	.047	1.25	326	25				
6	2.80	.071	1.57	493	26				
7	3.36	.115	1.88	798	27				
8	3.92	.278	2.20	1929	28				
9	4.48	.394	2.51	2734	29				
10	5.04	.322	2.82	2235	30				
11	5.60	.235	3.14	1631	31				
12	6.16	.174	3.45	1208	32				
13	6.72	.136	3.76	944	33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

763-PA-S

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT: Comparison of SCS Freeboard Storm with PMF
FILE NO.
SHEET NO. ___ OF ___ SHEETS
FOR: PA-468
COMPUTED BY: DJW DATE
CHECKED BY DATE

SCS Freeboard Storm Data:

Rainfall = 24.5 inches
Runoff = 21.2 inches
Peak Inflow = 2734 cfs

PMF Data for PA-468 Site (Hydromet. 40):

Index Rainfall = 22.15 inches
Geographic Adjustment Factor = 95%
Distribution:

6 hr	118%
12 hr	127%
24 hr	136%
48 hr	142%
72 hr	145%

Hop Brook Reduction Factor = 0.80

Revised PMF index rainfall = 22.15 × .95 × .80 = 16.83 inches
Total 6-hr. rainfall = (1.18)(16.83) = 19.86 inches
Runoff from 6-hr rainfall = 19.86 - (6)(0.05) = 19.56 inches
(Initial abstraction of 1" occurred early in PMF)

Since small watersheds (i.e 0.4 mi²) are only sensitive to peak rainfall periods, it is reasonable to compare the Freeboard Storm and the PMF based on the maximum 6-hour runoff. Since the Freeboard Storm runoff (21.2 inches) is greater than the 6-hour runoff from the PMF (19.56") and because the SCS unit hydrograph is conservative, the Freeboard Storm flood is an acceptable substitute for the PMF.

8313

SCS-347 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MARTIN CREEK W/S PA-468

STAGE-DISCHARGE COMPUTATIONS

STAGE	H_o ℄ orifice elev 72.5	$H_o^{1/2}$	$Q_o = 9.13 H^{1/2}$	H_{wr} riser crest elev ~~70.5~~ 91.0	$H_{wr}^{3/2}$	$Q_{wr} = 46.50 H^{3/2}$	$Q_o + Q_{wr}$	H_p ℄ or Hat elev 40.0	$H_p^{1/2}$	$Q_p = 19.59 H^{1/2}$	℄
	← Orifice		→	←	Riser Weir	→		← Conduit		→	
72.5	0	0	0				0				
74.5	2.0	1.41	13				13				
76.5	4.0	2.00	18				18				
80.0	~~19.5~~ 17.5	~~4.18~~ 3.74	~~38~~ 25				~~38~~ 25				
91.0	~~28.5~~ 18.5	~~5.34~~ 4.3	~~49~~ 39	0	0	0	~~49~~ 39				
92.5	~~30.0~~ 20	~~5.48~~ 4.47	~~50.4~~	1.5	1.84	86	~~136~~ 127	52.5	7.25	142	
93.5	21.0							53.5	7.31	143	0
95.3								55.3	7.44	146	5
96.2		Note: To convert to dam elevation						56.2	7.50	147	10
96.9		datum, add 1155.0 to table						56.9	7.54	148	15
97.5		elevations.						57.5	7.58	148	20
98.6								58.6	7.66	150	30
99.6								59.6	7.72	151	40
	treat as weir, C=3.1, L=1.75; $(0.7)^{3/2}=0.59$										
72.2	0.7	0.59	3					3			
92.6	30.1	5.49	50	1.6	2.02	94	144	52.6	7.25	142	

PA-468
STAGE - DISCHARGE - SHEET 1 OF 2

SEE SHEET 2 OF 2 FOR AUX. SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

15-11-64 5-1-64

15 17

$H_a^{3/2}$	$Q_w = 46.50 H^{3/2}$	$Q_o + Q_w$	H_o Elevation cfs	$H_A^{1/2}$	$Q_A = 19.59 H^{1/2}$	q	Hp sh 3/7 * ES-124 L=100	dc sh 1/4 ES-85	W_e b+2dc = 75+2dc	$Q_e = W_e q$	Qtotal	Qnet = Qtotal - Qbase (-3)
						← Auxiliary			Spillway →			
		0									0	0
		13									13	10
		18									18	15
		35									35	32
0	0	47									47	46
1.84	86	126 127	52.5	7.25	142						143	127
			53.5	7.31	143	0	0	0	75.00	0	143	140
			53.3	7.41	146	5	1.76	0.92	76.84	384	530	527
			54.2	7.50	147	10	2.65	1.46	77.92	779	926	923
			56.9	7.54	148	15	3.39	1.91	78.82	1182	1330	1327
			57.5	7.58	148	20	4.04	2.32	79.64	1593	1741	1738
			58.6	7.66	150	30	5.14	3.07	81.08	2432	2582	2579
			59.6	7.72	151	40	6.14	3.70	82.40	3296	3447	3444
			3									0
2.02	94	144	526	7.35	142							139

C-6

SEE SHEET 1 OF 2 FOR MAIN SPWY.

PA-468
STAGE - DISCHARGE - SHEET 2 OF 2

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
DER ID No. 58-132
SCS ID No. PA-468

SUSQUEHANNA COUNTY COMMISSIONERS

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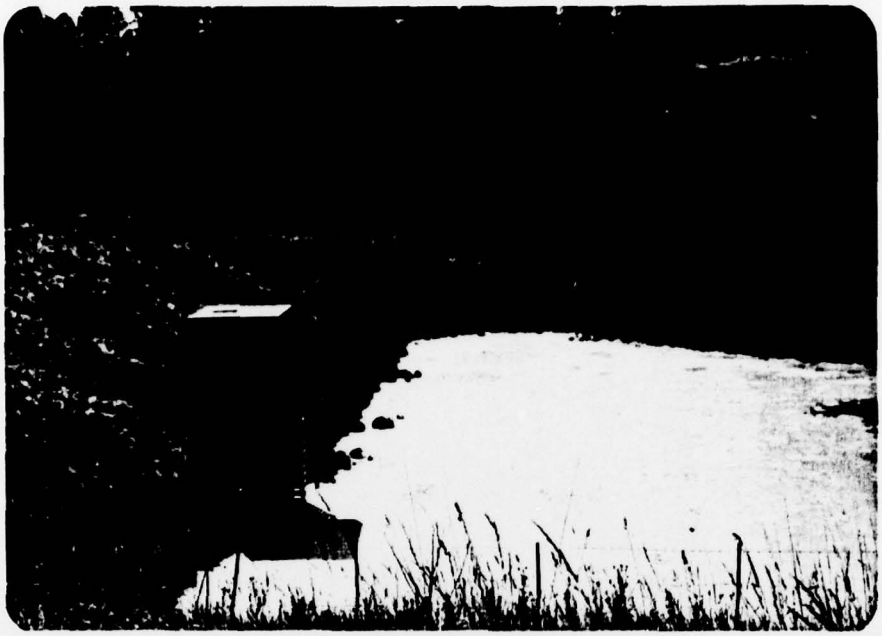
APPENDIX D

PHOTOGRAPHS

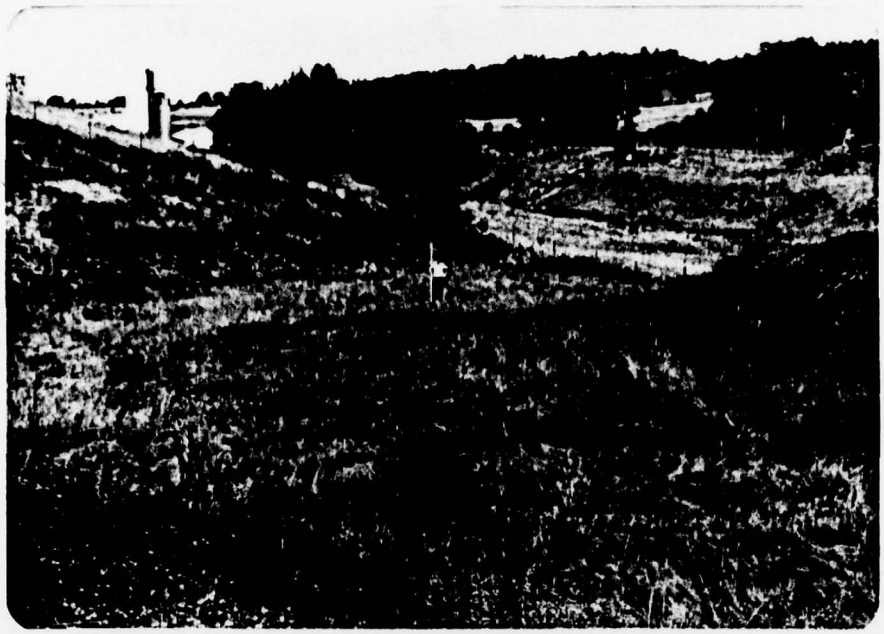
A. Upstream Slope of Embankment.

B. Downstream Slope of Embankment.



C. Main Spillway Riser.

D. Main Spillway Impact Basin
and Foundation Drain Outlet.



E. Auxiliary Spillway Approach Channel.

F. Auxiliary Spillway Exit Channel.

SUSQUEHANNA RIVER BASIN

BROOKLYN RUN, SUSQUEHANNA COUNTY

PENNSYLVANIA

PA-468 Dam

NDI ID No. PA-00046
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APPENDIX E

GEOLOGY

PA-468 Dam

APPENDIX E

GEOLOGY

1. General Geology. The damsite and reservoir are located in Susquehanna County. Susquehanna County lies north of the Wisconsin Terminal Moraine and, with the exception of the summit of Elk Hills, was entirely covered by ice. Deposits of glacial drift of variable thickness cover the County except where they have been removed by erosion. The County is drained entirely by the north branch of the Susquehanna River and its tributaries. The Susquehanna River enters Susquehanna County from New York near the northeast corner of the County and re-enters New York just north of the town of Great Bend, Pa. The river does not again re-enter the County but comes within four miles of the southwest border. As the County lies entirely north of the glacial border, there are abundant, undrained areas occupied by swamps and lakes. A geologic map is presented on Plate E-1.

The rock formations exposed in Susquehanna County range in age from the Post-Pottsville of Pennsylvanian age to the Chemung of Devonian age. The youngest formations, the Post-Pottsville and Mauch Chunk, are exposed only in the southeast corner of the County. The older rocks are exposed along the western and northern boundaries.

The major structural feature of the region is the Lackawanna Syncline, which terminates in the southeast corner but whose axis turns and runs due north along the Wayne County line. Along the west side of this synclinal axis, the strata dip steeply to the southeast. Over the next four to five miles westward, the strata flatten out to nearly horizontal. Toward Tunkhannock Creek to the northwest, the strata reverse dip on the axis of an anticline that continues southwestward as far as Union and Clinton Counties. The rocks in the remainder of the County lie nearly horizontal but are folded locally into minor anticlines. The Wilmont Anticline enters at the southwest corner of the County and extends across Auburn Township. Its southward dip rarely exceeds 1°, so that the strata in the southern part of the County are nearly horizontal.

2. Site Geology. PA-468 Dam is underlain by the Susquehanna Group of Devonian age. A report dated September 3, 1965 states that the foundation material consists primarily of a dense glacial till. Bedrock was encountered at extensive depth. The Susquehanna Group is a complex unit of conglomerates, sandstones, siltstones and shales. From the base of this unit to the top, the following changes occur in northeastern Pennsylvania: (1) grain size increases from bottom to top; (2) average thickness of beds increases upwards; (3) percent red color in shales increases upwards; and (4) in general, percent silica in rocks increases upwards. Bedding is usually well-developed with thicknesses up to sixteen feet in the coarser beds. Joints are usually open and steeply dipping or vertical. The shales disintegrate rapidly when exposed to the atmosphere. The siltstones, sandstones, and conglomerates are moderately resistant to weathering. There are abundant swamps and lakes in the area, which is characteristic of this glaciated low plateau section in which the dam is located.

USDA SCS

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

Penna. County Susquehanna Watershed Martin Creek Subwatershed Tributary Hop Bottom Creek

Site number PA-468 Site group I Structure class C Investigated by Ronald C Frey Geologist (signature and title) Date 5/15/65

INTERPRETATIONS AND CONCLUSIONS

Interpretation

This site is excellent from all aspects of geology. Rock was encountered on the right abutment near the surface and at depth across the site from station 4+50. A glacial till (ML) has filled the valley and through soil formation a hardpan (SM) layer has developed upon the till. Very little rock excavation will be required in the emergency spillway. Borrow is very abundant and of very good quality.

Foundation

The foundation is excellent with no consolidation problems expected. Differential settlement near the rock drop off at station 4+50 will not occur because of the high density and compactness of the till. Bearing strength of the till and hardpan is very high. Permeability of the hardpan layer is believed to be slight and the till is essentially zero. It is suggested that a positive cutoff be employed through the top ML layer on the right abutment and at least 2.0 feet on the left abutment. Hardpan will be sufficiently impervious to act as a base for the cutoff. Consideration should be given to the complete removal of the alluvial zone as mentioned under the principal spillway section. This zone could allow considerable leakage and possible piping.

Principal Spillway

The recent alluvium (SM and GM) is permeable and less dense than the till. Consideration should be given to the removal of this eight foot zone of alluvium. This would mean excavation only as wide as the present stream channel which is the limit of the material. The till on the other hand is very dense with a very high bearing strength. The conduit could either be placed directly on the till or on till backfill. Either method would provide a suitable foundation. The small amount of alluvium removed could be mixed with the borrow material and used in the fill.

Borrow

No detailed computations on the amount of borrow have been made, but rough calculations shows that more than double the required amount is present. An unusual situation is present here insomuch as the removal of borrow must create a sediment pool of 3.5 acre feet. In view of this special problem the actual delineation of where to obtain borrow is left to the discretion of the design engineer, who can then plan its removal from the areas where more storage is required.

It is suggested that the top 0.5 feet of soil be removed to the spoil area. This leaves 1.0 to 1.5 feet of ML material which can be mixed with the underlying hardpan. This material (ML and SM) should go into the shell of the structure. The till can best be utilized as core material.

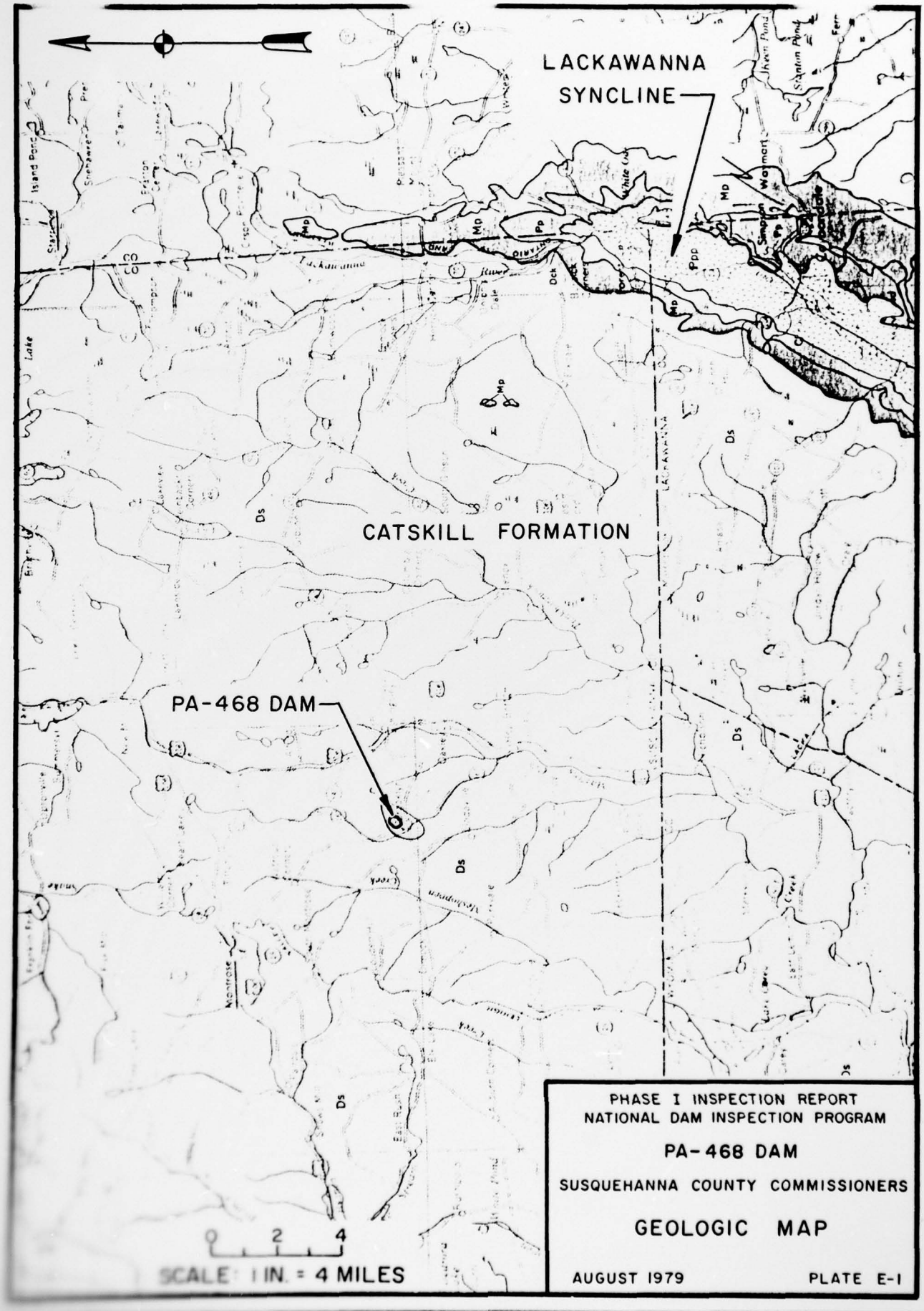
Many road cuts in the area show shear failures due to over steepening slopes. Not less than 3:1 side slopes in the borrow area are advisable without the use of berms.

Emergency Spillway

Material removed from the spillway is probably best suited for use in the shell of the proposed structure. This would be based on the use of a core of the denser till. The rock which will be removed is not very strong and can be ripped to a minimum depth of 5.0 feet below the top of the weathered zone. It is questionable if ripping can be successfully continued beyond this depth.

Proposed Diversion PA-468b

Four test pits were dug along the centerline of the proposed diversion. Rock was not encountered and no problems are anticipated during construction.



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PA-468 DAM

SUSQUEHANNA COUNTY COMMISSIONERS

GEOLOGIC MAP

AUGUST 1979 PLATE E-1